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SPINAL ANALGESIA.[1]

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I am thankful for the honour you have shown me in asking me to give you the latest views on spinal analgesia—a branch of medicine which is of vital interest to such a large section of the profession.

A systematic survey of the subject is not within the scope of this paper, but I shall attempt to present a summary of our knowledge concerning certain vital aspects. The fear of respiratory and circulatory depression has long deterred many from employing spinal analgesia. In recent years scientific investigation and the larger experience of individual anæsthetists have done much to promote a better understanding of the factors involved in the causation and treatment of these bugbears. The exclusion of as many variable factors as possible from the technique of administration has reduced mortality. The employment of this form of analgesia for 85% of major surgical procedures in some clinics abroad shows the confidence it has gained.

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on April 24, 1940.

ANATOMY.

The adult vertebral column has four curves which concern the spinal anæsthetist. They are the cervical, thoracic, lumbar and sacro-coccygeal. The third lumbar vertebra marks the most anterior part of the lumbar curve, and the fifth thoracic vertebra the most posterior part of the thoracic curve. With the patient horizontal, the fifth

thoracic vertebra is the lowest point of the thoracic curve and the place to which the hyperbaric solution will gravitate, producing anæsthesia to the nipple line. The spinous processes of the vertebræ are horizontal in the cervical and lumbar regions, and opposite the bodies of their respective vertebræ. Spinal puncture is easiest in the lumbar region, where the processes are horizontal and the intervertebral spaces largest. With the patient bent forward, a needle introduced at right angles to the skin between the tips of two lumbar spines should not meet any bony resistance, but should pass to the subarachnoid space. Puncture in the mid-line traverses the supraspinous and interspinous ligaments as well as the *ligamentum subflavum*, whilst the diagonal approach from a point half an inch from the mid-line encounters only the *ligamentum subflavum*, and the needle is less likely to be deflected.

The spinal cord extends from the *foramen magnum* to the lower border of the first lumbar vertebra in the adult, whilst in the new-born it extends lower and may reach the lower border of the third lumbar vertebra. The nerve roots of the *corda equina* extend beyond this and are frequently touched, but seldom damaged, by the modern, fine, short-bevelled needle. Not being tightly stretched, they are easily pushed aside.

The portion of the nervous system chiefly concerning the spinal anæsthetist is the autonomic, as it governs the heart's action, the respiration, the vasomotor system and the activity of the gastro-intestinal tract. It is made up of two great divisions, the sympathetic and parasympathetic, which are antagonistic to each other in their action.

The Sympathetic Nervous System.

There are two main divisions of the sympathetic nervous system, namely, the ganglionated cords or trunks and the plexuses and associated ganglia.

1. The ganglionated cords are paired chains of ganglia which begin in the neck and pass downwards through the thorax and abdomen to the coccyx, where they join to terminate in the unpaired ganglion impar. Except in the cervical region, the ganglia are arranged segmentally and are connected to each other by large cords and to other parts of the nervous system by innumerable fibres. They are associated with the spinal cord and the segmental nerves by *rami communicantes*, which are of two kinds, the white rami and the grey rami.

The white rami, composed mostly of efferent fibres from the central nervous system, emerge with the anterior nerve roots of the spinal nerves from the first thoracic to the first or second lumbar segments. They are preganglionic connector fibres and may end in one of three ways: (*a*) by forming synapses in a ganglion of the trunk, (*b*) by passing up or down the trunk to form synapses in a ganglion at a different level, or (*c*) by passing to the associated ganglia and plexuses. They always transmit their impulses to post-ganglionic excitor fibres which terminate as visceral branches supplying the heart, lungs and viscera or as somatic branches.

The grey rami are post-ganglionic excitor fibres which return to the spinal nerves and use the trunks of these as a pathway to the vasomotor and other somatic terminations.

It is important to note that the white rami are intrathecal and are early exposed to the action of a spinal anæsthetic, whilst the grey rami lie outside the canal and are later affected. The white rami are the only pre-ganglionic fibres of the sympathetic system. They carry all the vasomotor constrictor impulses, and the blocking of all the white rami by an anæsthesia extending up to the first thoracic nerves will allow vasodilatation of every blood vessel in the body.

The cervical ganglia, two or three pairs, form the upper limits of the ganglionated cords. They receive their preganglionic fibres from the first to the fifth thoracic nerves, having no white rami. From the cervical ganglia come the superior, middle and inferior cardiac accelerator nerves. The inferior cardiac accelerator nerve from the inferior cervical ganglion carries most of the accelerator impulses and, being the lowest, is most frequently affected in spinal analgesia, thus allowing its antagonist, the vagus, to slow the heart.

2. The plexuses and associated ganglia are closely interrelated and their post-ganglionic fibres tend to form plexuses and surround the vessels which they follow. The main plexuses are the cardiac, epigastric, hypogastric, Auerbach's *et cetera*. The afferent elements are largely concerned in the formation of local reflex arcs, and they are also known to be a secondary pain path, producing pain, vomiting and discomfort caused by tension on a viscus or mesentery in segments, the spinal nerves of which are paralysed.

The Parasympathetic Nervous System.

The parasympathetic nervous system also has two divisions, namely, cranial and sacral; but it supplies only parts of the body. The outflows to the parasympathetic correspond with the white rami of the sympathetic, but their action is exactly antagonistic.

1. The cranial division arises in the mid-brain and sends impulses via the cranial nervous system to numerous ganglia, the post-ganglionic fibres supplying the head, neck, thorax and abdomen. The vagus is the part of special interest to the spinal anæsthetist. Its action is antagonistic to the action of the sympathetic, and when the sympathetic is paralysed by a spinal anæsthetic it exerts a depressor action in the thorax, slowing heart action and depressing the respiration, and a motor accelerator action in the abdomen, causing constriction of the small and most of the large bowel.

2. The sacral division is formed by efferent preganglionic fibres from the second, third and fourth sacral nerves, which unite to form the *nervus erigens* passing to the pelvic plexuses. Like the cranial division, its action is antagonistic to that of the sympathetic. It supplies vasodilator and

motor constrictor impulses to the descending colon, rectum and anus, and also supplies the genitals. Under the influence of a spinal anæsthetic the sacral portions of both the sympathetic and parasympathetic become paralysed, so little change is seen in the parts supplied.

The Cerebro-Spinal Fluid.

The spinal fluid is very sensitive to chemical change. Normal saline solution introduced into the subarachnoid space has caused convulsions and death. The fluid is normally clear, colourless and of low specific gravity, the average being 1·007. The cell content is less than three per cubic centimetre, an increase in the number denoting meningeal irritation. The pH varies between 7·035 and 7·040, and is equal to that of the plasma. The quantity of the cerebro-spinal fluid is of particular interest. The total is estimated to lie between 100 and 150 cubic centimetres, one half of this being in the ventricular system and 30 to 40 cubic centimetres in the large reservoirs at the base of the brain. This leaves 20 to 35 cubic centimetres as the content of the spinal arachnoid. Table I gives the volume required to fill the subarachnoid space to various levels in people of normal height. The figures given should be added to for people of more than normal height. Dosage in spinal analgesia is based on height, not weight.

TABLE I.

Level.	Amount.
Lumbar III	2 cubic centimetres
Lumbar I	4 cubic centimetres
Thoracic IX	6 cubic centimetres
Thoracic VI	8 cubic centimetres
Cervical I	16 cubic centimetres
Total contents of canal ..	20 to 35 cubic centimetres

The pressure of spinal fluid within the canal is basic and hydrostatic. To the basic pressure is added the hydrostatic pressure of the column of cerebro-spinal fluid when the patient is in the erect position. The pressure varies from 60 to 500 millimetres of water and is increased by brain tumours, alcoholism, uræmia and vascular hypertension. The pressure is lowered by mechanical blockage, cachexia, vascular hypotension and leakage. The withdrawal of large quantities of spinal fluid, with consequent sudden fall in pressure, causes the brain to herniate through the *foramen magnum*, producing what has been termed lumbar puncture death.

Spinal headache is thought to be due to a fall of spinal pressure from leakage; but the toxicity of the anæsthetic drug may be a far more potent cause. The symptoms come on the day following the administration of the anæsthetic, and are nausea, vomiting, faintness, giddiness, mental confusion and intense occipital headache. Headache is aggravated by exercise, restlessness and the upright position, and is relieved by rest and keeping the head low.

Communications of the subarachnoid space with the fourth ventricle are of no practical importance to the spinal anæsthetist. The work of Grodinski and Baker with diazo reaction of "Novocain" showed that only with very high dosage in spinal analgesia did any of the drug reach the fourth ventricle, and then only in very low concentration.

A theory of the cause of headache following spinal anæsthesia put forward by Etherington Wilson bears out these conclusions and is worthy of note. He maintains that leakage from the subdural space is too small to be of importance, and that even the large loss of cerebro-spinal fluid in laminectomy and other operations does not of itself cause headache. Absorption of the drug and its entry into the circulation are rapid. The presence of numerous and large sinuses in the occipital region suggests the possibility of a large collection of the drug in this region, which may conceivably cause œdema of brain tissue, venitis and meningeal irritation.

Physics.

The movement of anæsthetic solution in the spinal canal is governed by constant physical laws. The main ones concerning us are: (*a*) dispersion, which is the mechanical mixing or churning of the fluids; (*b*) convection, which is the gravitational shifting of the anæsthetic solution within the canal; and (*c*) diffusion, which is the gradual intermingling of the fluids by osmosis.

Dispersion is aided by the following mechanical factors: (*a*) the speed and force of injection; (*b*) the volume of injected fluid; (*c*) the baffle action of the nerve roots and denticulate ligaments; (*d*) pulsation of intradural arteries; (*e*) the emptying and filling of veins with respiration; (*f*) pressure of the spinal fluid, dispersion being inversely proportional to the pressure.

Convection is governed by: (*a*) the amount of difference between the specific gravities of the injected fluid and the spinal fluid; (*b*) the degree of slope of the spinal canal; (*c*) the amount of difference between the temperatures of the two fluids; (*d*) the absorption of the anæsthetic drug into the nerve tissue, and the mixture of the two fluids which cause slowing of the convection rate. As the drug is removed from the solution and mixing continues, the specific gravity progressively approximates that of the spinal fluid, till it finally equals it and convection ceases. This safety factor is referred to by Maxon as the "brake action". The fixation of the anæsthetic drug in the various nervous elements exposed to its action depends mainly upon two factors, namely, selectivity of the nervous tissues and the concentration of drug in the anæsthetic solution. The posterior roots have a greater affinity for anæsthetic drugs than have the anterior roots and may become anæsthetized by a solution of insufficient strength to cause paralysis of the motor roots. This safety factor is apparent when we observe that sensory anæsthesia is generally at least two segments higher than motor paralysis. Further confirmation is shown when the phrenic nerve, arising from the motor roots of

the third, fourth and fifth cervical nerves, may still function when the head is anæsthetic. The time required for the fixation of a drug by the nerve tissues and the manifestation of complete brake action should be complete in ten minutes. But if dosage is excessive and localized to a few segments of the cord, the result resembles the blotting paper which can absorb only a certain amount of ink, and fixation may require up to thirty minutes.

Diffusion is caused by the amount of difference in the osmotic tensions of the two fluids. Its action is so slight that we can disregard it entirely.

To achieve uniformity of result in spinal analgesia, and to place a drug at the required level with certainty, as many variable factors as possible must be eliminated and a fixed technique rigidly adhered to. All the factors enumerated above which influence dispersion, convection and diffusion can be kept constant with the exception of the dosage, which will alter the volume of injected fluid.

Verhs states:

> The laws of physics and chemistry do not vary. The anatomical make-up of the individual varies somewhat, but corrections can be made. The physical action of the various segments of the cord remains the same. Block of any part produces a like reaction under exactly the same conditions in any two people. There remains the single vital factor in spinal anæsthesia which, while apparently under direct control, is still the most variable factor. We refer to the anæsthetist.

Complications Arising during Spinal Analgesia.

Fall of Blood Pressure.

The fear of a large fall in blood pressure accompanying a high spinal anæsthetic and a lack of knowledge of its causation and treatment have been potent factors in preventing the wider adoption of this form of anæsthesia. Blood pressure is maintained by: (*a*) force and volume of cardiac output, determined by the efficient oxygenation of the heart muscle and by the volume of blood available to the heart from the *venæ cavæ*; (*b*) resistance of the vessels, which depends on the vasomotor impulses conveyed by the white rami and on the support of the voluntary and involuntary musculature. Efficient analgesia for upper abdominal surgery must extend to the fifth thoracic segment, and I shall consider the effects which cause a fall in blood pressure produced by anæsthesia to this level.

1. Vasomotor paralysis causes lowered resistance. Four thoracic segments—less than one-third—remain effective, so that two-thirds of the white rami are paralysed and the resistance in the anæsthetic area is greatly lowered. Attempts to raise the blood pressure by stimulating the action of the four remaining pairs of white rami may have the effect of driving more blood into the paralysed area, thus causing a further fall of blood pressure and increasing the oxygen want in the unparalysed area, which includes the vital centres.

2. Paralysis of leg and abdominal musculature produces a further lowering of resistance, by lessening the muscular support of the veins and by lowering intraabdominal tension.

3. The intercostal paralysis decreases respiratory exchange, and the resulting oxygen shortage in the tissues soon produces lessened myocardial efficiency and lowers the force of the heart's contractions.

4. The filling of the superior and inferior *venæ cavæ* is largely dependent on the mechanical effects of the respiratory movements—the so-called "pump action" of the thorax, so that intercostal paralysis lessens the volume of blood available to the heart, thus decreasing its output. Lowered resistance to the circulation, lowered volume available to the heart and lowered oxygen supply, acting both centrally and on heart muscle, combine to cause circulatory depression. In extreme cases or when proper treatment is delayed a vicious circle is established, causing oxygen deficiency in the tissues and heart failure.

That there are other factors, at present unrecognized, seems to be borne out by the fact that cases do occur in which the fall of blood pressure is out of all proportion to the height of the anæsthesia. By ligation of the cord at different levels Bower has demonstrated that respiratory depression is the most important factor in producing falls in blood pressure. The actual amount of fall or even the percentage of fall is not the all-important thing, but rather the fall of pulse pressure and the general condition of the patient. Even a large fall of blood pressure may be of little consequence, providing the pulse is not rising. Sise sums up the matter by stating:

> It is not like the drop in shock where a vicious circle appears to be formed from which it is hard to pull out. The drop in spinal anæsthesia is one which normally reverses itself as the anæsthetic wears off, when the patient seems to be none the worse for it.

Morbidity is higher, however, in patients who have experienced a large fall in blood pressure.

Respiratory Depression.

The stimulus for respiration is carbon dioxide. The sensitivity of the respiratory centre is governed by its oxygenation. A slight deficiency of oxygen makes the centre more sensitive and the response to the stimulus from a normal percentage of carbon dioxide is increased. A more pronounced oxygen deficiency causes a great lowering of sensitivity of the respiratory centre to its normal stimulus. In spinal analgesia a lowered blood pressure, respiratory depression from intercostal paralysis, and inefficiency of the heart, all tend to cause oxygen want at the respiratory centre, and finally it may become completely insensitive to the stimulation of normal concentrations of carbon dioxide. At this point one might be tempted to increase the carbon dioxide concentration by administering carbon dioxide or "Carbogen"; but the experiments of Seevers and Waters have shown conclusively that an increase of carbon dioxide fails to stimulate respiration and further decreases the blood pressure.

Intercostal and abdominal paralysis, itself accentuated by oxygen want, produces lessened respiratory exchange and increases oxygen want. When the level of the anæsthetic is at the clavicle, all the respiratory mechanism is paralysed except the diaphragm, which, however, is capable of producing sufficient respiration to maintain life. In the complete spinal analgesia of some anæsthetists the phrenic nerve may remain active. It arises from the motor roots and the lessened affinity of motor nerves for anæsthetic drugs is responsible for this safety factor.

Respiratory Arrest.

Respiratory arrest is the result of paralysis of the diaphragm, which occurs if the concentration of the drug is sufficient to block the phrenic nerves.

Slowing of the Heart.

Slowing of the heart is caused by anæsthesia high enough to block the efferent impulses from the first to the fifth thoracic nerves, which go to the cervical ganglia and then to the cardiac accelerator nerves. This removes the "whip" and allows the vagus a greater measure of its slowing action. Other factors are the delay in the filling of the *venæ cavæ* and the lessened circulatory resistance. Oxygen want here also produces a central and a local effect. Cardiac failure is the primary cause of most deaths from spinal anæsthesia.

Nausea and Vomiting.

Nausea and vomiting are almost entirely due to tension on a viscus or mesentery. Impulses travel to the cord by way of the afferent elements of the sympathetic plexuses and, reaching it at a level above the level of anæsthesia, produce nausea and vomiting from reflex stimulation. Other causes are the presence of bile in the stomach from relaxation of sphincters, sensitivity to morphine, and cerebral anæmia. It was thought that oxygen-want might be the main cause of some of the vomiting; but this theory is disproved by the almost complete absence of vomiting in thoracic operations under high spinal anæsthesia as compared with its frequent occurrence in abdominal surgery with anæsthesia of the same height. A psychic factor is operative in apprehensive patients.

Treatment of Complications.

The treatment of the effects just enumerated can be divided into prophylactic and combative measures.

Prophylactic Treatment.

1. Careful selection of cases is a factor which has been largely disregarded in the past, for there has been a tendency to employ spinal anæsthesia for patients who are already moribund and when the risk is considered too bad for general anæsthesia. The old saying was: "He is too weak for a general, give him a spinal." The new one is: "He is too strong for a general, give him a spinal." The powerfully built, robust person, who may prove difficult to anæsthetize with a general anæsthetic, is the type best suited for spinal analgesia. Definite contraindications are shock, hæmorrhage, low blood pressure, cachexia *et cetera*.

2. An exact technique must be used and the dosage and the height of the anæsthesia must be controlled so that they are the minimum that will comply with surgical requirements.

3. Ephedrine should be given fifteen minutes before the injection.

4. The patient must be thoroughly prepared, especially by the administration of fluids and glucose; he must be reassured; adequate premedication is given; quiet is insisted upon; the eyes are bandaged and the ears plugged.

Combative Treatment.

Combative treatment depends for its success on the early recognition of the onset of complications and the promptness and thoroughness of the remedies applied. Systolic and diastolic blood pressures should be taken regularly and charted together with the pulse and respiratory rates. This statement will be challenged by many. However, it is my opinion that such records, when considered with the general appearance of the patient, provide the best means of accumulating knowledge with which to interpret the various clinical changes seen during anæsthesia. They certainly provide the only way of collecting large numbers of accurate records, from the scrutiny of which valuable information may be gleaned in the future. Our neglect of this side of modern anæsthetic practice I believe to be one of the reasons why we make so few original contributions to scientific advance in this field. The chart will give early warning of danger. A 30% fall of the systolic and diastolic curves with the pulse pressure remaining about the same and the pulse rate curve falling parallel to the blood pressure curves, is of little importance. If, however, the systolic and diastolic curves begin to approximate each other, thus showing a fall in pulse pressure and myocardial weakening, and if at the same time the pulse rate curve rises, the patient is showing signs of a degree of depression and heart failure which must be dealt with promptly. Governed by the response to treatment, some or all of the following measures will be necessary.

1. Adoption of the Trendelenburg position, once sufficient time has elapsed for the anæsthetic to become completely "fixed", is the most rapid and most effective way to correct cerebral anoxæmia and to place the volume of circulating blood where it is most effective.

2. Oxygen or a light anæsthetic mixture rich in oxygen should be given by the closed method. The work of Sollmann and Haldane shows that the inhalation of pure oxygen increases the oxygen dissolved in the plasma from 0·6% to 2·6% and the oxygen combined with the hæmoglobin from 18·5% to 18·7%, which amounts to a total increase of 40% in the oxygen available to the tissues.

The preceding measures are aimed primarily towards correcting the central effects of oxygen-want and lessening cardiac insufficiency. The following are instituted with the object of raising the resistance of the circulation and increasing the volume. The chart, referred to above, will help the anæsthetist to determine which group is most needed, and the response will determine how long and to what degree treatment should be continued.

3. Rapidly acting circulatory and respiratory stimulants are given intravenously in sufficient dosage, namely, "Coramine", "Cardiazol", "Metrazol", "Veritol", picritoxin, "Neo-synephrin hydrochloride" *et cetera*.

4. Peripheral, as opposed to central, vasoconstrictor stimulants, given intravenously, will help to raise the peripheral resistance and raise the blood pressure. Of these, epinephrine and adrenaline (1 in 100,000) produce satisfactory results and are best given in small doses as an addition to the fluids being given by the intravenous method. For this purpose, once the blood pressure has fallen, ephedrine is of little value except as a direct heart stimulant.

5. The intravenous administration of fluids compensates for the loss of volume of the circulating blood through the factors already mentioned.

6. Respiratory arrest is a complication demanding instant and thorough artificial respiration. A good airway is assured by the introduction of a large endotracheal tube, and artificial respiration with pure oxygen in a closed circuit can be carried out by intermittent pressure on the bag to inflate the thorax and pressure on the thorax to deflate it. A pressure sufficient to assist mechanically in emptying the lungs of blood is of great assistance; but if pressure is too high the right side of the heart is embarrassed, and this adds to the circulatory inefficiency. Failing this method, the use of mouth-to-mouth respiration is satisfactory, and is more efficient if the anæsthetist fills his lungs with oxygen from time to time. The more ordinary methods of artificial respiration are not effective with paralysis of the abdominal muscles, the intercostals and the diaphragm. Prompt and efficient methods may carry the patient over till the effects of the anæsthetic wear off and spontaneous respiration is resumed. Sise quotes the recovery of such a patient without after-effects.

The following signs are warnings of impending danger, and the presence of any of them should be the signal for the administration of oxygen without delay: (*a*) air hunger, (*b*) complaint of weight in the chest, (*c*) inability of the patient to phonate. The onset of whispering in a patient under high spinal anæsthesia is a sign of very grave danger.

7. In regard to psychic effects, the far-reaching results of fear, even when cloaked by an air of nonchalance, are well known to us all. Premedication, if adequate, should have taken care of this up to the time of the actual operation; but the sights and noises of the theatre, including inadvertent remarks made by the surgeon or his assistant, can be most upsetting to an apprehensive patient and may produce effects of a most serious character. Many writers have recorded a great lessening of all the immediate complications of spinal analgesia as a result of adequate premedication. During the operation a light inhalation anæsthetic is a boon to anxious patients and offers a means of preventing psychic trauma and of exhibiting an atmosphere of high oxygen concentration. Anæsthetists who make a practice of combining such an inhalation with high spinal anæsthesia report a remarkable lessening in the incidence of complications, all of which are due ultimately in part or in whole to oxygen-want.

8. In regard to vomiting, its treatment amounts to avoiding its causes. When traction on a viscus or mesentery is the cause, as, for instance, when the stomach is being examined or an attempt is being made to rotate the liver, the cooperation of the patient and surgeon is needed. If traction needs to be firm, it can be done without harm to the patient if it is done slowly and if periods of traction are interspersed with periods of rest. A conscious patient can provide great assistance if he is asked to hold his breath and bear down, the descent of his diaphragm thus being used to assist the surgeon.

Drugs to be Used.

From the brief survey presented, it is apparent that the ideal spinal anæsthetic can be produced with certainty only when certain basic requirements are complied with. Therefore, though the drugs available are many and daily increasing in number, and though numerous differences in technique of administration have been described, our choice is very limited.

The perfect drug has yet to be found; but "Percaine" seems to approach the ideal more nearly than any of the others when a comprehensive view is taken of the requirements. Its toxicity is lower than that of most, if not all, of its competitors when compared on the basis of relative dosage. The duration of the analgesia it produces is far in excess of that of the other drugs used. It is rapid and certain in effect. It is marketed in solutions which can be controlled by gravity when introduced into the subarachnoid space, and is ready for use. In this country "Percaine", since its introduction in 1932 by Dr. R. J. Silverton, has rapidly gained in favour and is now the first choice of most spinal anæsthetists.

The technique introduced at the same time by Dr. Silverton for use with the "Percaine" in its 1 in 200 heavy or hyperbaric form is well known and widely used. If anybody is unfamiliar with this technique I refer him to its description in *The Australian and New Zealand Journal of Surgery* of January, 1934. It affords the means of accurately controlling by gravity the anæsthetic effects of a hyperbaric solution of "Percaine". Such a technique is ideal for low spinal analgesia when the operation

is to be conducted with the patient horizontal or with the head raised. Most anæsthetists of experience agree that to cover the full range of spinal anæsthesia a technique embodying the use of hypobaric solutions is also desirable. The need for such solutions is evident in high spinal anæsthesia when the Trendelenburg position may be necessary for treatment of collapse or in low spinal anæsthesia for operations requiring the early use of the Trendelenburg position. To use the heavy solution in this group of cases predisposes the patient to the danger of part of the dose remaining "unfixed" when the head is lowered and the level of anæsthesia is allowed to rise beyond safe limits.

For use with the hypobaric "Percaine" solution W. Etherington Wilson has devised and published a technique which offers precision of control not attained by other methods. The method is based on the physical laws of convection and dispersion already mentioned; its main point of difference from other hypobaric methods is the use of the vertical position and timing of the ascent of the drug to reach certain levels.

Details of the Etherington Wilson Technique with "Percaine".

Etherington Wilson uses a 1 in 1,500 solution of "Percaine" (specific gravity 1·003). The selection of cases for spinal administration, premedication to the stage of amnesia, and the general preparation of the patient are the same as those generally adopted.

The third lumbar interspace is considered the highest consistent with safety, and the puncture is performed by the usual method. The rate of injection is constant at 1·5 seconds per cubic centimetre, and is made with the patient in the vertical position, and with the temperature of the solution the same as that of the patient. Under these conditions the solution rises at the rate of one inch in three seconds. Table II shows the dosage. From the point of injection to the spinal

TABLE II.

Dosage Table for a 1 in 1,500 solution of "Percaine".

Height.	Cubic Centimetres.	Seconds.
Low	10	20
Medium	12	30
High	15	40

nerve roots of the first lumbar, tenth thoracic and fifth thoracic nerves the distances are 6, 9 and 13 inches respectively in people of average height. In each case add one inch for tall patients and subtract one inch for short patients. Thus for an average patient anæsthesia to the fifth thoracic nerve is reached in 40 seconds. From the commencement of the injection the time is measured by a clock showing a large second hand, and at the expiry of the previously calculated number of seconds the patient is immediately placed in the 15° Trendelenburg position. This prevents the further rise of the anæsthetic level and the unfixed portion of the drug returns caudalwards.

The following points should be borne in mind: (i) Angle of inclination. If the vertical position is not maintained the mixing is uneven and the ascent faster (*vide* experiment). (ii) Temperature. A very cold hypobaric solution will at first act like a hyperbaric solution and will fail to rise.

The Etherington Wilson technique is based on experiments which he carried out with fluid of known specific gravity in "imitative" spinal canals of glass. He used the term "mock spinal analgesia" to describe them, and though they do not fulfil all the conditions of the spinal canal, they provide a clear picture of what is happening. The absence of the spinal cord and of the absorption of the drug into the nervous tissues is balanced in the glass canal by a larger amount of fluid, and the rate of the rise is about the same.

I shall demonstrate two experiments which will show the behaviour of the heavy and light "Percaine" solutions available here. In both cases the canal is filled with a solution having a specific gravity of 1·007, equal to that of the spinal fluid. The blue solution has the same specific gravity as heavy "Percaine", namely, 1·024, and the red solution a specific gravity equal to that of light "Percaine", namely, 1·003.

Experiment I. The canal is sloped at 45°. (*a*) Heavy "Percaine" falls with gravity remaining against the lower side of the glass. (*b*) The light "Percaine" rises against gravity, keeping to the upper side of the glass. Note how each of the "Percaine" solutions remains in a mass and tends to avoid mixing. Clinically this produces imperfect anæsthesia and is overcome in some techniques by turning the patient over. Another method of producing mixing is to allow the solution to rise vertically.

Experiment II. The canal is vertical; the other factors remain the same. Light "Percaine" is injected and is allowed to rise to a predetermined height by timing; and then the tube is inverted into a 15° Trendelenburg position. Note the mixing to the required height and the further cessation of its spread with the change of position.

SUMMARY.

1. The anatomy concerned in spinal anæsthesia has been outlined.

2. Causation and treatment of complications arising during analgesia have been discussed.

3. The physical laws governing the mixing of fluids have been stated and their application to spinal analgesia demonstrated.

4. The Etherington Wilson technique has been put forward as one based on sound principles and capable of being used to place anæsthetic solutions at the required height with precision.

5. It has been suggested that the keeping of detailed anæsthetic records and the frequent use of experiments are valuable means of increasing scientific knowledge.

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SNAKE BITE IN PRACTICE.

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EARLY in 1935 it was decided at a medical conference held at Cairns to form a registry of injuries caused by plants and animals in tropical Queensland, and accordingly forms of *questionnaires* were forwarded to all medical practitioners practising in tropical Queensland. However, the appeal for information has with but few exceptions been on the whole very disappointing. Similarly cooperation was sought, through the executive of the Queensland Ambulance Transport Brigade in Brisbane, of the different stations in North Queensland, to which an appeal was made in a circular from their own headquarters. The response to this was exceedingly disappointing, and in some cases a point-blank refusal was encountered, even when specific information was asked for. However, the Cairns centre has been, on the contrary, most helpful, and has joined with a great deal of energy in the efforts to make the inquiry effective. It must be understood that the vast majority of the injuries which it was desired to investigate passed first through the hands of the ambulance organization, where first aid was applied, and some, especially the slighter and by no means uninteresting cases, were never seen by any medical attendant.

The investigation of snake bite was undertaken in the same way as injuries from other animals and plants, and figures appertaining to these injuries were secured from the Queensland Government Statistician. For statistical purposes, Queensland has been divided into four districts, namely, tropical coastal, tropical inland, subtropical coastal and subtropical inland. The tropical coastal district includes Edgecumbe, Rockingham, the Peninsula and the northern portion of Point Curtis (Rockhampton, Broadsound, Fitzroy, Livingstone); the tropical inland district includes north-western Queensland, the northern portion of far western Queensland (Boulia, Winton) and the northern portion of central western Queensland (Aramac, Belyando, Longreach, Peak Downs). This work is chiefly concerned with the tropical coastal and tropical inland regions, both being north of the Tropic of Capricorn; the population of the former, according to the census returns for 1933, reached 209,646, and was nearly seven times as great as that of the corresponding very much more extensive inland district, which had only 30,208 inhabitants. The mean coastal population was estimated to have increased in 1938 to 224,162, but in the inland districts of the tropics it had slightly receded to 30,156.

All cases of injury by animals are divided into three classes as far as deaths in Queensland and the morbidity among patients treated in public hospitals are concerned; they are: snake bite, bites of other venomous animals and food poisoning. Hence these statistics are of very limited value in an estimate of the incidence of these injuries. As for food poisoning, this apparently may include many cases altogether outside the scope of this inquiry, such as might be produced by mineral agents—for example, contamination with lead, arsenic *et cetera*.

The items under the heading "other venomous animals" obviously imply that all snakes are venomous. This is far from being the case. I once listened to the boast of a medical practitioner at a medical conference in a Victorian country centre that he had treated seven patients suffering from snake bite with no fatality; but he made no reference to the identity of the serpents, and evidently did not consider it worth while doing so, for the impression was given that all snakes were venomous. Certainly the majority of species of snakes, including all the unimportant worm-like members of the family Typhlopidæ (mostly subterranean in habit) and all the constrictors of the family Boïdæ—pythons (carpet snakes), Aspidites *et cetera*—as well as large numbers of the most important family of Colubridæ, which form the vast majority of Australian snakes, are not in any sense venomous as far as to man is concerned; their bites, which by the way are common enough, are quite harmless except for the actual local injury and the possibility of septic infection, in much the same way as bites from most other vertebrates, such as the non-rabid dog.

"The Manual of the International List of Causes of Deaths" (1929 revision) includes the following sub-titles:

Class 176. Attacks by venomous animals.

A. Snake bite.

Bite of serpent. Bite of venomous serpent. Bite of viper. Snake bite.

B. Other.

Bite of insect. Sting of insect. Venom of animal. Venom of centipede. Venom of scorpion. Venomous bite. Venomous sting. Stone-fish. Portuguese man-of-war.

Class 188. Injuries by animals.

Bite of (any animal). Bite of dog. Bite of rat. Gored. Injury by any animal. Kick (by horse or other animal). Traumatism by horses (due to viciousness). Shark bite.

In the fifth revision of "The Manual of the International List of Causes of Deaths", which is to be used for classification purposes as from January 1, 1940, there is but slight variation:

Class 194. Attacks by venomous animals.

(*a*) Snake bite.
(*b*) Other.

Class 188. Injuries by animals.

Note: This does not include rabies, bite of snake, bite or sting of insect or poisoning by venomous animals, or injury by animals in farming.

It appears, then, that bites from non-venomous reptiles, which are shown to be very common in tropical Queensland, cannot be shown in Class 188, and must therefore be included in Class 194, "attacks by venomous animals". The statistics therefore give an entirely false idea of the position.

In Table I is shown the number of victims reported to have been admitted to public hospitals on account of snake bite. (The figures for 1934 and 1937 are not available.)

TABLE I.

Patients.	Tropical Coastal Queensland.				Tropical Inland Queensland.			
	1933	1935	1936	1938	1933	1935	1936	1938
Male	55	39	59	75	3	3	4	2
Female	10	8	18	20	1	2	3	1
Total ..	65	47	77	95	4	5	7	3

These figures show that the male sex preponderates over the female in the proportion of about four to one. That such admissions to hospital are much more numerous in coastal districts is probably due to the fact that hospitals are far more accessible here than inland, as well as to the fact that the vast majority of such cases turn out to be exceedingly trivial and that when victims are remote from such institutions they usually recover before there is sufficient time for their removal to hospital.

The corresponding figures for South Queensland are shown in Table II.

TABLE II.

Patients.	Sub-Tropical Coastal.			Sub-Tropical Inland.		
	1935	1936	1938	1935	1936	1938
Male	38	31	26	15	16	12
Female	16	13	22	7	3	7
Total ..	54	44	48	22	19	19

It is thus noted that despite the fact that South Queensland has three or four times the population, the number of hospital admissions in the coastal regions is even greater in tropical coastal than in subtropical coastal regions. It is probably correct that snakes are far more abundant in tropical than in subtropical regions; but it appears also that the figures are greatly swollen by admission to hospital of patients who were not bitten at all, or the diagnosis of whose condition is exceedingly uncertain and rests on the flimsiest of evidence.

However, when the mortality figures are examined it is noted that the number of deaths in Queensland is exceedingly small when compared with the number of admissions to hospital of victims stated to have been bitten. Thus, according to the 1938 returns, the only death among the 98 victims in tropical Queensland admitted to hospital was that of one male, although in the south one man and one woman succumbed among 67 admitted to hospital. It is not to be supposed that actual snake bites — and certainly not bites from venomous snakes—are as innocuous as these figures suggest; nor is there any warrant for the opinion that such a low mortality is the result of treatment, for it may be asserted with confidence that without any treatment whatever the mortality would scarcely be much greater. Indeed, there is abundant evidence to show that a large proportion, if not the majority, of such cases should never have been classified as of snake bite at all.

The following ludicrous incident, which actually happened in Cairns, illustrates the curious psychology of the friends of the patient, the hospital staff and the Press.

While J.H., an intelligent bare-footed youth, aged fifteen years, was walking along the roadside in broad daylight, somebody noted a red mark on the inner side of his foot; but the boy himself declares positively that he did not feel any bite. When a search was made, a black snake was discovered, which was promptly dispatched and subsequently determined to be *Pseudechis porphyriacus*. The astonished boy was rushed to hospital, although there was not the slightest evidence that the snake had produced the mark, nor was there any clinical evidence that he had been bitten at all. Nevertheless he was detained until next day, and the hospital record certified him to have been admitted for snake bite. In addition, an announcement was not only made in the local Press, but was telegraphed to and published in the papers throughout Queensland.

The actual reason for the large number of such hospital admissions is the fear that a bite from a venomous reptile has taken place. Such a cautious attitude is surely justified, even if in the long run it should prove groundless in the majority of instances. It must be remembered that a large proportion of the population frequently go about bare-footed, even at night time. A prick on the skin by something unseen, especially at night time, causes much fear or apprehension, although the prick may have been caused by an inanimate object, such as a twig. First aid is promptly sought and the victim is taken by ambulance to hospital, where he is at once admitted for observation; he is generally discharged next day, when it is clearly evident that no serious injury has taken place—and this after such first-aid treatment as the application of a tight ligature, scarification of the wound and the application of concentrated permanganate of potash solution.

A special endeavour was made to examine such victims as early as possible; but the poor cooperation made this exceedingly difficult. In most cases it was appreciated that the lesion was too insignificant—rather that the time and trouble required to investigate it were not justified; very often indeed, there was a serious doubt as to whether the subject had been bitten, or even a frank disbelief that it was a case of snake bite at all. Frequently the newspaper was the first source of information of a case of snake bite, and generally this was broadcast throughout the State. Journalism today seeks with avidity such reports, and is indifferent as to whether the reports can be substantiated or not. Even if, later on, it is shown that no such snake bite has occurred, no correction ever takes place; the thirst for exciting news is ever present and the accuracy of such reports is not sought. Moreover, many emanate from ambulance stations, which are particularly anxious to advise the Press of such events, to give an idea of their activity and usefulness, and thus pave the way for more generous financial support. On a number of occasions attempts have been made to secure details by dispatching telegrams to the medical attendant, sometimes without any response, but frequently with the intimation that the diagnosis of snake bite was unjustified.

Dr. H. S. Harper, of Mossman, reports the following two cases, which had been reported in the Press as bites by death adders (*Acanthophis antarcticus*:

R.S. is an Italian boy, aged nine years. His father states that he saw the death adder bite the child on the leg. Not having a knife, he immediately bit a small piece out of the child's leg and applied a ligature. On examination, apart from the damage caused by the father's teeth, the child showed no evidence of snake venom poisoning. It is doubtful whether he had been bitten at all. We get a number of these cases among the Italians every year. The snake escaped.

G.S., an Italian, aged forty years, states that he was bitten on his left foot by a snake (death adder) in a cane paddock, and immediately scarified the wound and applied a tourniquet. On examination there were no symptoms of snake venom poisoning and no deviation from normal in any system. The snake escaped.

Dr. Harper considers it very doubtful whether this man was actually bitten.

Much the same sort of thing occurs in the filling up of the hospital returns. There is no place for

any doubtful or uncertain diagnoses (the vast majority might well fit into such a category if it were provided), and it is simplest to fill in "snake bite", even when it can reasonably be assumed that no such bite occurred. One wonders, indeed, where such cases (usually of no injury whatever, except perhaps a scratch from a twig in the dark) might properly be recorded. It is no doubt insisted that a diagnosis be given in each case, even when it is impossible conscientiously to make one.

It should be repeated that the Cairns centre of the Queensland Ambulance Transport Brigade has assisted very considerably in the inquiry. In the first place, whilst the victim was being attended to, every effort was made not merely to seek information concerning the offending agent, but to secure the agent itself. Attempts were made to induce friends and bystanders to collect the reptile responsible for the injury; but in most cases this was impossible. It is remarkable that hitherto, in practically all cases, no attempt had been made to establish definitely the identity of the snake, even when it had been destroyed, and sometimes, as in one instance, a desire for revenge was evinced by further destruction, even although the reptile had been killed. In this case the snake was obtained after attempts had been made to burn it; but unfortunately it was then beyond recognition.

It is regrettable that such scant interest is taken in the identity of the reptile, even by the victim's own medical attendants, who rarely indeed make any effort to secure the specimen. All snakes apparently are treated alike, despite the fact that the bites of most apparently are harmless. This is most unfortunate, and certainly does not conform to the general tradition of medical practice, to endeavour to understand the nature of the condition being treated and its significance. The great deal of research performed by Dr. C. H. Kellaway and his associates at the Walter and Eliza Hall Institute in Melbourne, resulting in the production of the "Symposium on Snake Bite", therefore becomes quite valueless and superfluous under such unsatisfactory conditions of practice.

Examinations of the sites of punctures are generally complicated, not only by the scarifications carried out by first-aid attendants, but also by the application of strong solutions of Condy's crystals. It is not, however, suggested that these procedures should be omitted.

Bites of Unidentified Harmless Snakes.

Numerous examples of bites by unidentified (probably harmless) snakes have been collected, of which the following are selected:

C.G., a man, aged sixty-seven years, whilst walking bare-footed in water in very wet weather, trod on a snake, which bit him on the dorsal aspect of the right foot and hung on until it was lifted out of the water. It may have been a water snake. There were no symptoms other than that of the local puncture, which was hidden by the application of Condy's fluid.

A boy, aged four years, picked up a "green" snake by the tail. It turned round and bit him on the radial margin of the ring finger of the right hand. The only symptoms were two small punctures close together, hidden by potassium permanganate.

W.V., a man, aged forty-nine years, trod on a snake in the dark; it curled round his leg and bit him on the heel above the sandshoe which he was wearing. The punctures were hidden by the application of potassium permanganate. There were no symptoms.

R.J., aged thirteen years, trod, while bare-footed, on a snake in water in a swamp. He saw the snake, which was a foot or two long, and was believed to be a python; but this is uncertain. There was a single puncture on the lateral aspect of the right hallux. No effects other than the puncture were noted.

A man, aged twenty-two years, while wading in water about three or four inches deep, stood on a snake, which flapped and bit him on the medial aspect of the left ankle. The snake was seen and was stated to be grey with black rings, but was not available for determination. When he was seen later there were no general effects.

Bites by Identified Harmless Snakes.

Fat-Headed Snake (Boiga fusca).

C.G.H., aged twenty-five years, while walking along a road, felt a momentary brush of a snake on his forearm, but with scarcely any pain. Two tiny, almost invisible punctures were found on the anterior surface of the right forearm. The snake was secured and determined as *Boiga fusca*.

Green Tree Snake (Dendrophis punctulatus).

V.M., a girl, aged nine years, while playing bare-footed, trod on a snake, which bit her on the medial aspect of the head of the first metatarsal. The pain lasted an hour, but was possibly due to scarification and the application of potassium permanganate. There were no general symptoms. The snake was secured and determined as *Dendrophis punctulatus*.

Bites by Pythons.

The python, like all members of the family Boïdæ, although non-venomous, is not generally known to be so, even by medical attendants.

Dr. N. J. O'Connor, of Mareeba, reports the following case:

A man, aged thirty-six years, obtained a specimen of a small python, probably *Python spilotes*, about three feet long, from the Mitchell River, and was about to give a demonstration to a crowd which had gathered in his store. However, on attempting to pick up the reptile, he was bitten on the right index finger and promptly flung the serpent among the crowd. Apart from three small puncture wounds there was no disturbance other than general excitement and nausea, with flushing and sweating, probably due to fright.

Bite by Unidentified Venomous Snake followed by Recovery.

Dr. H. S. Harper, of Mossman, reports the following case:

L.V., a boy, aged three and a half years, was playing near a patch of ratoon cane only a few inches high; returning home, he asked for a drink of milk, vomited and became ill. His mother noted blood specks on the leg and small abrasions or punctured wounds, and, suspecting snake bite, drove the boy to hospital. On his admission to hospital the child was pale and restless, with laboured, gasping respiration; he occasionally vomited a small quantity of brownish fluid, but was not fully conscious. The temperature was subnormal; the pulse rate was 140 per minute, and the pulse was thready at times and sometimes imperceptible, but there was no appreciable sweating. An elastic tourniquet was applied to the thigh. One puncture mark only could be detected. The general symptoms lasted two and a half hours.

Bites from Death Adders followed by Recovery.

Dr. H. W. Anderson, of Herberton, reports the following case:

R.McG., a boy, aged eighteen years, was bitten on the right foot by a death adder, *Acanthophis antarcticus*. The snake was not produced for verification. He suffered from dysphagia, paresis of the eyelids, vomiting and drowsiness, and recovered in four days.

Dr. J. E. Overstead, of Cooktown, reports the following case:

Mrs. A.F., aged twenty-eight years, was bitten on the left medial malleolus while bare-footed in the garden. The snake was killed by her husband, who is sure that it was a death adder; but it was not available for verification. The snake made a single stab, but did not hang on, and then flattened itself on the ground. There was only one puncture wound, which was swollen and tender, with pain lasting about forty-eight hours. The patient was generally upset; she was sweating profusely and vomiting; her pulse rate was 108 per minute and the respirations numbered 26 per minute. Her mental faculties were alert, and she was fearful of impending death. Frequency of micturition was present.

Bite from Taipan with Recovery.

It is exceedingly unfortunate that the reptile in the following case, although it was dispatched and a special request was made to secure it, was not saved. Nevertheless there is little doubt of its identity. A duplicate which was produced and vouched for as the same species turned out to be the taipan, *Oxyuranus scutellatus*.

The following case was reported in the first instance by Dr. G. M. Sharpe, who was *locum tenens* at Mossman at the time. The information is greatly supplemented by statements from the victim subsequent to his recovery.

A man, aged forty-nine years, while looking for nails in his garage on January 19, 1939, casually placed his right hand on the bench alongside, not looking where it was placed. Feeling something unusual he immediately withdrew it with a large snake hanging on momentarily, until it fell of its own weight to the floor. This happened at 1.30 p.m. The bite, which was on the dorsal aspect of the right hand, caused shock, cold and a shivering sensation. A friend applied a ligature to the elbow within two minutes. Several small cuts made with a razor blade did not produce much bleeding. The patient was taken by ambulance sitting up to the Mossman Hospital, where he arrived at 3 p.m.; he felt rather sick and vomited after getting into bed. There was no headache. His pulse rate was 66 per minute; the systolic blood pressure was 135 and the diastolic pressure 90 millimetres of mercury; the respirations numbered 22 per minute. The drowsiness and pain lasted for two days, the latter due to the ligature and scarification; the ligature had not been removed until 9 p.m.—that is, seven and a half hours after its application. The arm was swollen afterwards, and the pain in the hand prevented sleep. The patient was unable to rise for two or three days, did not leave his bed for about eight days and was discharged from hospital on January 31, 1939—that is, twelve days after being bitten. He had lost his appetite for food as well as for smoking cigarettes, of which he formerly smoked two ounces weekly. However, he had likewise lost his sense of taste and smell.

On October 11, 1939, the patient reported that during the past two months he had regained partially the sense of smell, but it was altered. He had not regained his appetite for smoking. Everything smelled the same, and disagreeable, including tobacco. Shallots burned his mouth, but had no taste. The sensation of taste for salt and sugar was unaltered, but sauces and the like all tasted the same. Apart from the lost sense of enjoyment of eating he felt very well.

Fatal Bites from the Taipan (Identity not Verified).

The following cases are believed to be due to bites from the taipan, but unfortunately verification has not been possible in any case.

Dr. H. S. Harper reports the following case from Mossman:

An aboriginal man, aged thirty-five years, when riding a bicycle, is believed to have been bitten by a taipan. He arrived an hour later in hospital with a string tied tightly around his leg as a tourniquet; he was in a pulseless condition, sweating profusely. He fell off the bicycle in a convulsion, which passed off, leaving him very distressed mentally. His temperature was 96° F. The vomiting was projectile. Death ensued six hours later and was preceded by three convulsions, lasting about two or three minutes each.

Dr. A. M. Martell, of Atherton, reports the following case. Although the head was shot away, the snake was not kept; however, it is believed that it was a taipan.

H.S., a man, aged thirty-nine years, was bitten while on a fishing expedition on the Barron River near Kairi. First aid was applied, but it took about five hours before the victim reached the Atherton Hospital. Two punctures about three millimetres apart were present on the outer aspect of the leg, midway between the ankle and knee. Upon admission to hospital he was already cyanosed and comatose, with paralysis of the respiratory and throat muscles. His pulse rate was 84 per minute; the systolic blood pressure was 116 and the diastolic pressure about 80 millimetres of mercury. The respirations numbered 32 per minute and the pupils were dilated. Death occurred an hour after his admission to hospital.

Fatal Bite from a Venomous Snake of Doubtful Identity.

Dr. F. Piscitelli, of Ingham, records the following case:

A boy, whose age is not stated, while cutting timber, felt a bite on the right foot and collapsed after a few minutes. His father arrived ten minutes later and found him lying on the grass, perspiring and vomiting. Noticing a scratch on the dorsum of the boy's foot, he incised it and applied potassium permanganate, placing a ligature below the knee joint. The ambulance staff, however, found a puncture in the heel, which they scarified; they took the boy from Euruga to Ingham, to Dr. Piscitelli. He arrived at 5.15 p.m. The condition of the boy was then very low; he was vomiting, perspiring and drowsy. He was admitted to hospital and given the usual treatment, receiving also adrenaline, camphor and strychnine. At 5 a.m. the next day partial muscular paralysis of the neck, especially of the genioglossi, hyoglossi and styloglossi was present. He died in coma at 9.15 a.m.

The snake was not secured and its identity is doubtful; it is believed to have been *Acanthophis antarcticus* or *Demansia textilis* (brown snake).

Summary.

1. An attempt has been made to study the incidence of snake bite in tropical Queensland. Of many cases entered on the records as of snake bite, some are exceedingly doubtful and some are misleading.

2. Trivial and unimportant cases form the vast majority.

3. The poor interest shown in the identity of reptiles is evident, and the desirability of securing these whenever possible for determination is stressed.

4. Details are given of fatal and non-fatal cases of bite from identified and unidentified, non-venomous and venomous snakes.

5. Closer cooperation between attendants and ambulance stations is desirable for further study.

THE TECHNIQUE OF THE INTRACUTANEOUS TUBERCULIN TEST.

By DOUGLAS ANDERSON, M.D.,
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THE requisites for the application of the Mantoux test to small groups of persons and details of the technique of the test are here set out very briefly. The technique described differs from that described in the American literature[1] and recommended in the leaflets enclosed in packages of American tuberculin; but it is simpler, was devised to meet Australian conditions,[2] produces very few inconveniently sharp reactions and has been found satisfactory in some thousands of tests.

Requisites.

The following are the requisites for the test.

1. An all-glass tuberculin syringe. A syringe which is square on the outside is easier to handle than one which is round, and can be put down without risk of its rolling away. A second-hand syringe should not be used and a syringe once used for one strength of tuberculin should not be used for any other strength or any other purpose, because tuberculin readily adheres to glass.

2. A platinum-iridium hypodermic needle, three-quarters of an inch long, of standard wire gauge number 26 or 27. It is important to make sure before taking delivery of the needle that it fits the syringe accurately, making a watertight junction with it. The point should be resharpened before use so that the bevel is short. The platinum needle is not necessary when only a few tests have to be made.

3. Two stainless steel hypodermic needles, also fitting the syringe.

4. A hard-glass test tube one inch in diameter to contain the syringe and needles when they have been sterilized until they are ready for use.

5. A spirit lamp.

6. Ether in a medicine bottle labelled "Ether: Highly Inflammable".

7. Tuberculin "P.P.D."[1]

8. Cotton wool.

9. A small pair of dividers.

10. A ruler with a millimetre scale.

11. *Questionnaire* forms on which the persons to be tested may write name, age, whether they have lived in the same house as anyone suffering from tuberculous trouble, and if so whether the sufferer was a relative, whether they have ever had pneumonia, pleurisy, bronchitis or asthma, and if so, at what ages, and any other particulars which it may be desired to elicit.

Directions.

Sterilization.—Syringe, needles and test tube are sterilized by boiling. A sterile cotton-wool swab is introduced into the bottom of the test tube before the syringe and needles are put in. The tube is plugged with a sterile swab also.

Preparation of the Solution.—The correct amount of solvent is transferred with aseptic precaution to the vial containing the "P.P.D."; the tuberculin syringe fitted with a steel needle is used to pierce the rubber caps of the vials. Some air is withdrawn from the vial containing the tablet during the process so that the pressure will not force the syringe apart from the needle. The tablet should be quite dissolved before any of the solution is removed.

The Technique of Injections.—Some of the solution (but not all at one time, so that there will be some left in case of accident) is transferred to the syringe and the platinum needle is fitted.

The skin of the left arms of the subjects is cleansed in the hollow below the insertion of the deltoid muscle with a small cotton-wool swab moistened with ether. The swabs should be kept away from the lighted spirit lamp.

An intracutaneous injection of 0·025 cubic centimetre (one-fortieth of a cubic centimetre) of the solution is made. This produces a bleb 5 millimetres in diameter, and this fact may be used as an aid in measuring the volume injected.[3] During the injection the syringe is held so that the needle is almost parallel with the skin with the bevel outward and the needle is inserted till the opening in the point is only just covered. One finger of the operator steadies the plunger of the syringe and prevents it from falling out a little way and drawing air into the barrel: air should not be injected. The injection should be painless and scarcely felt.

The needle is sterilized by heating in the flame of the spirit lamp after each injection. If injections are being made in rapid succession the needle may be cooled quickly by expelling through it a very minute quantity (one one-hundredth of a cubic centimetre is sufficient) of the solution.

Examination of Reactions.—The site of injection is inspected after 48 hours, at which time the reaction, if any, is maximal. A reaction to the test consists of a wheal at the site of the injection. The wheal usually resembles a large mosquito bite; it is usually well defined, often surrounded by a blush,

[1] Several brands of tuberculin "P.P.D." are on the market and of equal value.
Parke, Davis and Company dispense "Tablets Tuberculin P.P.D. Second Test Strength" in a small package (Biological Product Number 484) containing two vials, each holding a tablet of 0·025 milligramme of purified protein derivative, and a vial of solvent, 0·5 cubic centimetre of which is used to dissolve each tablet.
Mulford Biological Laboratories, Sharp and Dohme, dispense "Tablets Tuberculin P.P.D. Second Test Strength" in an identical package (Product Number M970).
The foregoing packages are the most economical to use when groups of not more than fifteen persons are to be tested. Larger packings are available.
Burroughs Wellcome and Company dispense dried dilutions of tuberculin "P.P.D." in three strengths, of which the equivalent to the foregoing is "'Wellcome' Tuberculin P.P.D. No. 3". This is packed in containers of dried dilution equivalent to 0·05 milligramme of purified protein derivative together with containers of 1 cubic centimetre of solvent.

and it can always be distinctly felt by passing a finger over the surface of the skin. The wheal is often slightly irritable; there is seldom any soreness.

For record purposes the diameter of the wheal and the diameter of the blush, if any, are measured in millimetres with the aid of the pair of dividers and noted; and a note is made also of any vesiculation or ecchymosis, which denote very sharp reaction. Customarily reactions are disregarded or classified as doubtful if the diameter of the wheal is less than five millimetres, but after a little experience the observer can be sure of the specificity of smaller reactions down to about three millimetres.

Interpretation of Reactions.

Failure to react to the test is, generally speaking, good evidence of the absence of active or potentially progressive tuberculosis in the person tested.

References.

(1) J. D. Aronson: "The Purified Protein Derivative; With Special Reference to the Technique of Tuberculin Injections and the Grading of Reactions", *The American Review of Tuberculosis*, 1934, Volume XXX, page 727.

(2) D. Anderson and C. Harvey: "The Intracutaneous Tuberculin Test of Mantoux: A Method Employing a Single Injection", THE MEDICAL JOURNAL OF AUSTRALIA, 1938, Volume II, page 378.

(3) D. Anderson: "The Intracutaneous Injection of Measured Small Volumes of Liquid", THE MEDICAL JOURNAL OF AUSTRALIA, 1939, Volume II, page 68.

Reports of Cases.

DEVELOPMENTAL MEDIAN FISTULA OF THE NECK, OR CONGENITAL THYREOGLOSSAL FISTULA.

By NORMAN M. HARRY, M.S., F.R.C.S., F.R.A.C.S.,
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DEVELOPMENTAL median fistula of the neck, or congenital thyreoglossal fistula as it is usually called, is a condition of great rarity. Bland Sutton observed no patients with a congenital mid-line cervical fistula, and Bailey, after extensive investigations, was able to report only three cases. The lesion is not to be confused with the more frequently occurring thyreoglossal fistula which follows the infection and subsequent rupture of a thyreoglossal cyst.

The case reported here is of interest in view of the infrequency of occurrence of such fistulæ, but more especially because the morphology and position of the lesion strongly point to its not having arisen in association with the development of the thyreoglossal tract.

In the past such fistulæ have been classified unhesitatingly as of thyreoglossal origin. The writer does not deny that some congenital fistulæ in the mid-line of the neck are thyreoglossal. For instance, at least one of Bailey's cases of mid-line fistula arose almost certainly in that way. He does maintain, however, that in the present case, and possibly in many others, the origin is not from the thyreothymic tract. Those cases in which evidence of development from the thyreothymic tract is lacking should be classified under the heading of developmental median fistula of the neck.

Clinical Record.

The patient, J.H., a boy, aged five years, was brought to hospital for the treatment of an appendage on the front of the neck. It was associated with a small fistula in the jugular notch. He was an only child, and as far as could be ascertained no ancestors or living relatives suffered from any developmental anomalies. The mother stated that the appendage and fistula were present at birth. The doctor who attended her at the confinement noticed them and advised postponement of treatment until the child was older. The lesion, apart from its ugly appearance, caused little disability. There was just sufficient secretion from the fistula to keep its surface moist. There had never been any discharge onto the surrounding healthy skin.

Clinical examination showed the boy to be well developed physically and normal mentally. In the mid-line of the neck, at the level of the cricoid cartilage, a small appendage was noticeable; this was composed of subcutaneous fat. A subcutaneous band could be felt extending from its base to the mental symphysis. A very prominent dimple was present over the chin. The two halves of the mandible were seen on radiological examination to have united normally. Immediately below the appendage the skin in the mid-line of the neck was scaly and brownish red in colour; this extended downward to tre external opening of the fistula in the jugular notch (Figure I). The fistula, which was approximately one

FIGURE I.

centimetre deep, extended behind the upper part of the *manubrium sterni*, but remained superficial to the deep fascia. Neither the fistula nor the fatty appendage was connected with deeper structures, such as the larynx, and neither moved when the child swallowed. The thyreoid gland was not palpable, but the normal contour of the neck in that situation suggested that the organ was present. The appendage and fistula were removed surgically in one piece. A cheloid developed later in the scar.

At operation the superficial nature of the lesion was confirmed. The appendage was composed entirely of fat; it was normal in texture and covered by skin. Unfortunately histological examination of the wall of the fistula was not made. However, the position of the fistula and its association with a superficial appendage composed entirely of skin and fat, from which a strand of connective tissue ascended to the mental symphysis, indicated an abnormal development in the mid-line of the neck in the nature of a cutaneous inclusion, therefore independent of the thyreothymic tract.

Discussion.

In view of this fact it appears certain that some congenital fistulæ in the mid-line of the neck develop independently of the thyreothymic tract, and therefore should not

be classed as congenital thyreoglossal fistulæ. It is suggested that they should be classified rather as developmental median fistulæ of the neck.

Bibliography.

H. Bailey: "Thyroglossal Cysts and Fistulæ", *The British Journal of Surgery*, Volume XII, 1925, page 579.
H. Bailey: "Branchial Cyst and Other Essays on Surgical Subjects in the Facio-Cervical Region", 1929.
J. Bland Sutton: "Tumours Innocent and Malignant", 1922.

Reviews.

HAVELOCK ELLIS.

GREAT numbers of people throughout the world who admired the work of the late Havelock Ellis, his sanity, his wisdom, his detachment and his fearlessness, will welcome the news that his autobiography has been published.[1] Having judged the man from his writings, they will expect his own story about himself to reveal the man of their imaginings. Many will be surprised, a large number will be disappointed, but all will be interested. As a literary achievement the book is notable; as an autobiography of a man with such a personality as Ellis had it is in some ways disappointing. In his preface he writes that he has been concerned mainly with recording his inner life and that he has written chiefly of what is significant. He certainly has written of his inner life, and without reserve, as we should have expected from him; but he has not written a great deal about his life's work and he has written with a singular lack of humour. The lack of humour, however, cannot kill the interest of this work. The book has a peculiar effect on the reader. At one moment he is absorbed in the story of Ellis's struggles and difficulty; then he becomes weary of the endless repetition, for instance, of the strenuous efforts put forward to prove that Ellis really did love his wife. When the reader is exasperated almost beyond endurance there appears a noble passage that calls forth admiration and sympathy.

Ellis cares little what the world may think of the revelations about himself and Edith, his wife—"I know that, to a large extent, the world is inhabited by people to whom one does too much honour by calling them fools". He thinks that the narrative that holds a true picture of life should be helpful to many: "It has seemed to me that when it represents what may on nearer view seem failure and yet on far view supreme success, it is helpful to all."

Ellis was for some years in Australia. It was here that "all the obscure mysteries of sex" stirred "dimly and massively" within him, and he felt himself groping helplessly, as he puts it, among the difficulties of life. Here he first experienced a wish to penetrate the mysteries of sex and to enlighten the difficulties of life, so that those who came after him might find them easier than they had been to him. How well he accomplished this is known to us all. It was in the bush, in a dreadful little school of which he was sole master and in which he lived a lonely primitive existence, that he experienced what he calls his "conversion". He became conscious of a revelation. The clash in his inner life was due to what then seemed to him the hopeless discrepancy of two different conceptions of the universe. On the one hand was the divine vision of life and beauty which for him had been associated with a religion that he had lost. On the other hand there was the scientific conception of an evolutionary world which was alien to the individual soul and unable to attract love. It was Hinton, a man of science and a mystic, who through his writings made Ellis realize that the two conflicting attitudes were really harmonious though different aspects of the same unity. He was able to grasp the fact that religion is "a natural manifestation, a process that takes place spontaneously in the individual soul". Soon after this he made up his mind quite suddenly to study medicine. After his return to England he became a medical student. The account that he gives of his student days and of the immense amount of general literary work that he did at the same time is an amazing story.

We do not propose in this review to follow Ellis in his account of the hostile reception given to his first writings on sex or of the legal processes that followed their publication. Those who do not know the history will find it of the greatest interest. What is important is that the man whose works were at first regarded as obscene was, before he died, acclaimed as a benefactor of humanity, a fact that is shown by his election late in life to an honorary Fellowship of the Royal College of Physicians of London.

A great deal of the book is concerned with his love life. He tells of his love for many women—Olive Schreiner, "Amy" and others. His relationship with women was intimate and began when his mother introduced him to what he calls undinism—the performance by woman in the erect attitude of the act of micturition. Judged by conventional standards, the mother's action was, to say the least of it, most surprising. It would appear to indicate an abnormality in her make-up. Ellis tells us that his vision of this function is in some degree attached to his feeling of "tenderness" for women. It seems quite unnecessary for him to record the passing of urine on the top of the dome of Saint Paul's Cathedral by the young domestic who had climbed to that height with him, and who up to that time had been shy. But we have to accept the man as he was and to judge him, if judge we must, by what he made of life and by his influence for good in the world. He would in any case have been quite uninfluenced by any judgements passed on him.

Perhaps half of the book is devoted to the relationship that existed between his wife and himself—it was most peculiar. Why they married at all is not clear. They both "regarded marriage as sacred and inviolable" and neither of them felt any "personal need for an ecclesiastical sanction of marriage". They "accepted . . . the practical necessity of marriage" however. She was a lesbian; he was given to emotional attachments to women who appear to have been many in number. When he and Edith married they led separate and independent lives, socially and economically. Often for long periods they did not live under the same roof; when they did do so they were apparently contented and happy, though Ellis denies that he has known happiness in the ordinary sense of the term. They had moments of supreme comradeship and moments of great anguish. Edith's letters are quoted *ad nauseam* and they reveal her as consumed at times by fierce jealousy, though she sent her husband off for week-ends with "Amy" and bade him give "Amy" her love. The story has to be read to be understood, or rather to be grasped—it is not easily understood. Ellis's gibe at "all the married couples who, to outward view, lead so placid an existence of smooth routine" is unworthy of him. It may be, of course, that he, being who he was, came into contact with, or saw beneath the surface of the marriage of, those whose lives were "for a large part dead, with boredom gnawing at the core, unreal, paralysed, corrupt, selfish, fruitless". Eventually he and Edith, at her request, had a separation, though it was quite a friendly affair. At the end of her life she became psychotic and the tale is one of sadness and pity. In spite of the apparent queerness of the marriage and its peculiar adjuncts Ellis is able to write: "This woman by her peculiar temperament, by her acute sensibility, by her energy of impulse, by her deep hold of my most sensitive fibres, struck out the notes of joy and anguish which are love and which also are life. For love as I have known it is a passion more of what we call the soul than of the body; unlike the passion that is alone of the flesh, it is a flame that continues to burn even long years after the body that may seem to have inspired it is turned to dust."

[1] "My Life", by Havelock Ellis; 1940. London: William Heinemann Limited. Demy 8vo, pp. 159, with illustrations. Price: 15s. net.

Edith died many years before Ellis; and he had a fragrance of her round him to the end, though he also had his dear "Françoise", to whom apparently he was much attached. Of Ellis we can say that he lived a full life. To live his life called for courage and he had it, for simplicity and he had it, for wide sympathy and he had it. At the end of his life he wrote: "I see life whole, coldly, nakedly, all round, and though I am glad it is over, though I would not live it again, yet now that I seem to view it whole, I view it with joy, even with ecstasy."

He also writes: "I have been a dreamer and an artist, a great dreamer for that is easy, not a great artist for that is hard, but still always an artist, whether in the minor art of writing, or the greater art of comprehending, or the supreme art of living, wherein it is something to have tried even if one fails. So that if I am often sad—for the art of living is finally the art of loving, in which one becomes a master too late—I am always content."

ASTHMA.

THE classification of asthma conditions into three distinct types, allergic, microbic and mixed, by means of skin tests, bacteriological and serological tests, as described in "Asthma", by Dr. Frank Coke and Dr. Harry Coke, should be welcome and very helpful to all practitioners.[1] Their enthusiasm in their work, expressed in their words "we regard such a basis of classification as of the greatest import", may be realized, since it is on this classification that the second edition of the book has been arranged.

Unlike most people who write on asthma, the authors pay more attention to the investigation and treatment of the microbic and mixed types, types II and III of their classification, than to the study of the purely allergic type, type I. As the second and third types are undoubtedly the most difficult to treat successfully, the authors' suggestions should be greatly appreciated.

The results obtained in the treatment of the microbic type seem to have been more successful than is the experience of most clinicians; but this may be due to the more careful and scientific investigation carried out by means of their pathogen-selective culture and differential sedimentation test, full details of which are given.

Apart from the detailed discussion of asthma, the book covers all phases of allergy, is eminently practical, and shows a vast personal experience of the authors.

Study of this book cannot fail to be of benefit to the reader.

THE BLOOD AND BLOOD-FORMING ORGANS.

PUBLISHED in book form in "A Symposium on the Blood" are the papers read at the Institute for the Consideration of the Blood and Blood Forming Organs, at a meeting held under the auspices of the University of Wisconsin Medical School, in September, 1939, when representative leaders in hæmatological investigations were invited to attend.[2]

Such well-known people as Minot, Doan and Meulengracht are amongst those who read papers. In his "Some Historical Aspects of Hæmatology", which was given as a delightful after-dinner address, Meulengracht pleads for a wider vision in hæmatologists, who, he says, are apt to become so engrossed with the cell that they lose sight of the fact that it is essentially but a part of the whole. However, few of the contributors to this little book seem to have had need of this appeal, for in each section the general medical application of hæmatology is emphasized.

There is a concise survey of the new work done on prothrombin deficiency, its relation to vitamin *K*, and the therapeutic fields opened up by these discoveries; also a detailed and clear account of the coproporphyrin chemistry, indicating its present limitations as an aid to diagnosis, due to insufficient clinical studies, the dualism of the porphyrins and the difficulty of finding a reliable simple method of their estimation.

Russel Hadyn, in his paper on the "Nature of Hæmolytic Anæmias", discusses the intimate relationship between spherocytosis and increased fragility, and points out that spherocytosis is an early stage of hæmolysis. Spherocytosis can be congenital or acquired, the latter being due, as indicated by the recent work of Hamashek and Schwartz, to hæmolysins, either exogenous or endogenous in origin.

This is a symposium, not a reference or a text-book; but the arrangement of its contents could be considerably improved upon in the matter of spacing and sequence of articles. The minute details of recent experiments given in several sections should not have a place in a book of this nature; they make it rather tedious reading for the general medical reader.

The omission of a section on the problems of blood groups and transfusion at a time when they concern us so nearly, is surprising until we remember that this publication comes from America, where this subject is not yet of such acute interest.

Notes on Books, Current Journals and New Appliances.

DIETS FOR DIABETICS.

MEDICAL practitioners who wish to have diet lists for their diabetic patients will find very useful a small pamphlet that has been issued by Dr. W. Wilson Ingram.[1] Diets with varying Calorie values, from 1,100 to 2,600, for the twenty-four hour period are set out; measurements are given in ounces. There are several tables of substitution values. A "free list" of vegetables is included.

A YEAR BOOK OF DIAGNOSIS AND TREATMENT.

THE 1940 volume of the year book known as "Modern Treatment in General Practice" has appeared.[2] This volume is issued by *The Medical Press and Circular* and is edited by Dr. C. P. G. Wakeley. The articles of which the book consists deal with many different subjects and have been contributed by authors most of whom are well known in medical literature. The editor states in the preface that the aim of each author has been to provide "a link between specialized and general knowledge". This is not an attempt to cover the whole range of treatment, nor to deal entirely with new advances; the chapters, thirty-six in number, deal with isolated subjects, and nearly all the conditions discussed are likely to be encountered in any general practice. To give some idea of the range of subjects dealt with in this volume, the following may be mentioned: symptomatic hypertension, jejunal ulcer, rheumatoid arthritis, liver abscess, cancer of the rectum, gout, cancer of the larynx, acute cholecystitis, treatment of uterine disorders by endocrine methods, diabetes in children, cirrhosis of the liver, septicæmia, varicose veins, menstrual disorders, sterility, nephritis in children, growing pains. The book will be found useful by most general practitioners.

[1] "Asthma", by F. Coke, F.R.C.S., with the collaboration of H. Coke, M.R.C.S., L.R.C.P.; Second Edition, fully revised and illustrated; 1939. Bristol: John Wright and Sons Limited. Demy 8vo, pp. 278. Price: 15s. net.

[2] "A Symposium on the Blood and Blood-Forming Organs", by E. Meulengracht *et alii*; 1939. Madison: University of Wisconsin Press. Medium 8vo, pp. 372, with illustrations. Price: $3.50 net.

[1] "Diabetic Diets", by W. W. Ingram, M.C., M.D., F.R.A.C.P.; Second Edition: 1939. Australia: Angus and Robertson Limited. Crown 8vo, pp. 16. Price: 1s. net.

[2] "Modern Treatment in General Practice. Year Book 1940. A Year Book of Diagnosis and Treatment for the General Practitioner, edited by C. P. G. Wakeley, D.Sc., F.R.C.S., F.R.S.E., F.A.C.S., F.R.A.C.S.; 1940. London: The Medical Press and Circular. Demy 8vo, pp. 326, with illustrations. Price: 12s. 6d. net.

The Medical Journal of Australia

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All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

PSYCHIATRY IN GENERAL PRACTICE.

THAT there is considerable overlapping in specialist practice in medicine must be obvious to even the casual observer. This overlapping is inevitable. Most diseases, though beginning in one organ or system, extend their ravages further afield, with the result that the specialist within whose scope the disease comes in its early stages, may, if he is lucky enough to see the patient, find himself later on encroaching on the field of another specialty. Even the practitioner who determines to restrict his practice to one disease, often finds, before he knows what has happened, that he is faced with complications or extensions of disease that pass beyond the immediate limits of his chosen specialty. Psychiatry is often involved, for there is a mental factor in nearly every disease, early or late; and this is another way of saying that psychiatry has a bearing on most medical problems. We are reminded of Carrel's statement that disease is a personal event, that it consists of the individual himself, and that there are as many different diseases as there are patients. No specialist can, therefore, afford to be without a certain knowledge of psychiatry; but the specialist more often than not sees disease in its fully developed form. It is the general practitioner who sees the patient in the early days of his illness; it is the general practitioner who by clear insight and careful judgement can sometimes arrest progress of disease in its early stages; it is the general practitioner who generally has to determine when the patient should have specialist treatment and, most important of all, to which specialist he shall be sent. The general practitioner therefore needs to have more than a hazy knowledge of mental diseases. He has not only to be able to recognize mental disease itself in its early stages, when sometimes it may be said to mimic other conditions; he has also to recognize the mental element in an illness not obviously connected with the patient's psyche, that he may take appropriate steps in treatment.

In the world of today neurosis is much more prevalent than it has ever been. The causes of this state of affairs are too well known to require enumeration. The thoughts of most people will at once fly to the war in this connexion and to the havoc that it is playing and will yet play with the lives of millions of people. It may be well, however, to emphasize the fact that every sociological problem, and we have them in plenty, has a psychiatrical aspect. Apart from the actual manifestations of disease, then, the medical practitioner stands in constant need of knowledge of psychiatry. Unfortunately, psychiatry is too often looked on as the key to certification of a patient, that he may be admitted to a mental hospital. Too much emphasis cannot be laid on the view that psychiatry should be regarded rather as the means of treating the patient's first symptom.

To awaken among general practitioners a renewed interest in psychiatry it has been decided to publish in this journal a series of special articles on "Psychiatry in General Practice". The series includes thirty-eight contributions from authors who have responded to an invitation to write on a specified subject. The first article on the problem of mental invalidism appears in this issue. It will be followed by others on ætiology, on special disorders under their separate headings, on treatment and on various medico-legal problems. To the authors of these articles we offer sincere thanks

for their willing cooperation. Special mention must be made of Professor John Bostock, who responded with his usual generosity and encouragement to an appeal for help; it was largely on his advice that the scheme has been planned. The publication of this series was first of all suggested by a statement in the annual report of Dr. J. Catarinich, Director of the Department of Mental Hygiene of Victoria, regarding the failure of medical practitioners to recognize general paralysis of the insane in its early stages and drawing attention to the disaster attendant on such delay. If these articles make general practitioners think of the application of psychiatric knowledge as a remedial measure in the many conditions in which it is of such value, their purpose will be achieved.

Current Comment.

CONGENITAL CYSTIC DISEASE OF THE LUNG.

TEXT-BOOKS give little information on cystic disease of the lung, but in recent years the literature has contained several articles and reviews of the condition. An interesting discussion on this subject took place at a recent meeting of the Section of Medicine of the Royal Society of Medicine.[1] W. Burton Wood, who read the opening paper, said that the commonest form of cystic disease of the lung was a cystic bronchiectasis; it exhibited, he stated, such striking differences from saccular bronchiectasis that it was necessary to regard it as an entirely separate entity, though sometimes the two forms might be seen in the same lung. What Wood described as cystic bronchiectasis is of developmental origin, and is the result of an abnormal growth of normal tissues. Saccular bronchiectasis, on the other hand, is a degenerative process resulting from the destruction of normal tissues. This calls to mind the classification suggested by H. C. Ballon in his book "Surgical Diseases of the Chest", into congenital cystic diseases and acquired cystic diseases. Ballon's congenital group will include not only developmental cystic bronchiectasis, but such conditions as dermoids and teratomata. His "acquired cysts" will include, in addition to saccular bronchiectasis, hydatid cysts and cystic degenerations associated with the breaking down of lung tissue which is the site of malignant disease. The confusion in terminology, which cannot be regarded as other than a reflection of ignorance, is indicated by Maurice Davidson in his review of the subject in the 1940 "Medical Annual". He quotes Koontz as being the first to make a serious attempt to review the literature. Writing in 1925, Koontz referred to the following terms as being used synonymously: fœtal bronchiectasis, congenital cyst formation of the lung, congenital cystic malformation of the lung, atelectatic bronchiectasis, congenital bronchiectasis and honeycomb lung. Davidson remarks that Koontz obviously referred to polycystic disease, though single cysts are included by many under the term "congenital cystic disease of the lung". W. B. Wood, in the above-mentioned discussion, pointed out that cystic conditions of the lung have been found in the fœtus at or soon after birth, and in later life at all ages. The cysts are connected with the bronchial tree, usually communicate with the bronchi, and have walls with a structure resembling that of the bronchial walls. On microscopic examination the walls show evidence of disorderly growth, but not of degeneration. The cysts can be differentiated from ordinary bronchiectasis and even from that of saccular type. The cysts, as Wood explained, appear to result from a failure of the extremely complicated system of lung budding, which should proceed until the final alveoli are formed. T. H. Sellors, whose contribution on this subject to *Tubercle* in 1938 appears to be highly regarded by all recent writers, took part in the London discussion. On that occasion he drew attention to what he called two striking features—the regularity and constancy of the lining epithelium and the erratic distribution and amount of the supporting tissue. He said that even in large cysts which have been the site of suppuration, the epithelium often retains its integrity and orderly character. In the supporting structures fibrous tissue is the most common feature, but in some instances blood vessels, muscle and mucous glands predominate to such an extent that tumour formation has been suggested.

Sellors classifies cysts on an anatomical basis and divides them into solitary and multiple cysts. Solitary cysts are almost always large and may be either what are known as "balloon" cysts causing pressure signs, or smaller cysts the size of an orange, which remain "silent" unless they become infected. Multiple cysts he described as of two varieties—medium sized and small. Medium sized cysts occur in groups of two or three and vary in size from that of a cherry to the size of a golf ball. Small cysts are the size of a currant and may be as large as a cherry. Sometimes these follow a set distribution, lobular in character; the condition resembles saccular bronchiectasis and is sometimes known as honeycomb lung. On the other hand, the small cysts may be diffuse or scattered lesions with a patchy distribution. Davidson states that from the practical standpoint the most important division of cystic disease is that which distinguishes polycystic disease from solitary cyst. He points out that the symptoms caused by these two varieties are different. Polycystic disease, he states, furnishes the majority of cases of "congenital cystic disease" of the lung. In view of the differences of opinion regarding the origin of the condition, he thinks that it may be well to call it polycystic disease or to

[1] *Proceedings of the Royal Society of Medicine*, April, 1940.

follow the example of F. H. Young and N. C. Oswald and call it "multiple cystic disease". Be that as it may, there can be no doubt that there is a cystic lung condition that is congenital, and, this being so, there is no reason why the name should not be used. Whether other conditions may be grafted onto the congenital abnormality, or whether the abnormality may arise from some pathological change in early life remains to be determined. As W. B. Wood remarked at the London discussion, we do not know why failure of lung budding should occur in the embryo. Nor do we know why in most persons "the extremely complicated process of lung budding proceeds with exquisite precision till development is complete". Could we determine the latter question, we should have at hand the answer to many secrets in medicine that defy all our efforts. It may be that as the thoracic surgeon becomes more expert in his adventures in the thorax, light will be thrown on this interesting subject.

THE NEW OUTLOOK ON GONORRHŒA.

So vast has been the number of articles on chemotherapy in the medical journals in the last few years that many medical men have given up trying to keep pace with them. They want to read pithy communications which will help them in their practice; but the sight of a benzene ring and side-chains in the text of an article, though it has given the compositor never so much trouble, causes them to flip over the pages to read something else. However, the chemotherapy of gonorrhœa falls into a category of its own; for it is still in the stage of having champions and detractors, and the wonderful successes and sharp disappointments arising out of its employment in everyday practice are a stimulus to seek explanation.

J. C. Alexander and his collaborators in Texas, who have lately reported the successful use of sulphanilyl sulphanilamide in the treatment of gonorrhœa uncured by sulphanilamide,[1] have made and quoted from the literature in the course of their article a number of general remarks which simplify our understanding of the chemotherapy of gonorrhœa and its frequent failures. They note that these failures may be divided into two classes: those in which the drug has no noticeable effect on the course of the disease, and those in which the copious purulent discharge is replaced by a watery one, still containing gonococci. The explanation of these failures is still a matter of speculation; but they quote an interesting hypothesis of L. E. H. Whitby. In 1938 Whitby suggested that the obvious defence for a microbe against drugs of this kind would be the quick evolution of "resistant strains" of the microbe. The evolution of such strains in gonorrhœa is suggested when a certain drug in some cases quickly produces a speedy cure, while in other cases after its use the disease relapses and is resistant to further treatment with the same drug, though it may respond to a change of compound. How long, then, should a patient be treated with sulphanilamide before a change of drug is tried? Several workers have endorsed Whitby's dictum that what chemotherapy is going to accomplish it accomplishes quickly, and that there is no justification for the prolonged administration of drugs which in large doses may cause serious intoxication. Alexander and his colleagues hold that a therapeutic test of sulphanilamide in gonorrhœa should consist of 4·0 to 5·0 grammes given daily for six to eight days, and that if there is no response to this treatment the drug should be discontinued. The same principles of treatment hold good for sulphanilyl sulphanilamide, which is given in daily doses of from 1·3 to 2·0 grammes.

Two other concepts, now fairly widely appreciated, are referred to in the paper by Alexander and his collaborators, and attributed by them to H. Felke. In 1938 Felke noted that gonorrhœa was less apt to become resistant to treatment when treatment was delayed for eleven days. This delay was called waiting for "therapeutic maturity", and during the delay local treatment by irrigation was carried out. Felke also used an "interrupted method" of treatment, interposing a rest period of five days after six days' chemotherapy. But if therapeutic maturity was awaited, one course of treatment usually sufficed. The change to another drug when a course of sulphanilamide had failed to effect a cure was logically the next step in advance of the "interrupted method" of treatment. The practice of Alexander and his collaborators was to wait ten days after the discontinuance of the unsuccessful drug, during which time a thorough examination was made and local treatment was carried out as indicated; then treatment with sulphanilyl sulphanilamide ("Disulon") was commenced in doses of 1·3 grammes daily, with a rest period of five days after each period of five days of treatment; a total amount of 20 grammes of this drug produced a cure in 95 cases out of 100.

Of the new drugs used in the chemotherapy of gonorrhœa some are doubtless more successful and less toxic than others; but equal in importance to the discovery of newer and more effective drugs has been the gradual refinement in our manner of using them in order to do so to the best advantage. Thus three phases are recognizable in the response of the profession to the introduction of chemotherapy for gonorrhœa: first a wave of enthusiasm at the large proportion of easy cures which the treatment was found to effect; then a wave of disappointment and caution as a result of the large number of relapses and intractable cases; now again renewed enthusiasm as it has been found possible by improved methods to achieve almost uniform success. At a period in the world's history when a terrible dissemination of venereal disease is to be expected, the new discoveries are of immense importance. But, on the other hand, a certain mitigation of the public dread of gonorrhœa is already apparent, and obviously this may have far-reaching effects.

[1] *The American Journal of Syphilis, Gonorrhea and Venereal Diseases*, March, 1940.

Abstracts from Current Medical Literature.

MEDICINE.

Angina Pectoris.

A. CLERC AND J. STERNE (*La Presse Médicale*, November 18, 1939) describe the uses of a new drug, 1262F, in the treatment of anginal syndromes. Another drug, 883F, known as sympathicolytic, has been shown to have a sedative action in angina; the new drug 1262F (diethylaminoethercy-2-diphenyle) is a vasodilator, slows the heart and counteracts fibrillation better than quinidine. It improves the coronary circulation and has no depressing effect. The drug is given by mouth in doses of 0·05 gramme to 0·10 gramme thrice daily with the meals. The only ill effect noted was, rarely, muscular pains in the legs, the cremasters, the biceps and masseters, lasting for a few days. The authors prescribe the drug with success, relieving pain and checking fibrillation in patients with myocardial infarcts, in recurrent *angina pectoris* and angina with aortitis. The drug should be continued for several months, the dose being gradually reduced until approximately 0·1 gramme is taken per day. Certain irregularities of the acute type, especially ventricular fibrillation, subside during treatment, but the drug is not effective in chronic arrhythmias nor in myocardial insufficiency. A single dose of 0·2 gramme caused severe muscular pains and paresis of the limbs temporarily in one patient.

Thrombophlebitis.

L. A. CORNER (*The New England Journal of Medicine*, January 25, 1940) discusses thrombophlebitis and its pulmonary complications. Thrombophlebitis and venous thrombosis are considered together. The primary formation is a white thrombis due to an agglomeration of platelets; red clot forms both behind and in front of the white clot, and this red clot can be swept away at any stage with the formation of a pulmonary embolus. Venous thrombosis results from a number of causes. Local disturbances in the blood flow, recumbent posture and pressure on veins are all factors in some cases. The thrombus begins in the leg near the ankle as a rule, and gradually ascends to the knee or to the femoral or iliac vein. Tenderness, swelling or induration occurs in the leg, usually some days before the femoral vein is affected. Recurrent chill and tender toes are symptoms of thrombosis in typhoid fever. Pulmonary embolism is a complication of venous thrombosis. Massive fatal embolism is rare; but small emboli are of frequent occurrence. Often the only symptom is pain about the level of the diaphragm or the shoulder region, and the signs may be scanty, perhaps only a small area of pleurisy being present. Hæmoptysis is not very common; it occurred in less than half the cases in one series. Prevention of venous thrombosis should be aimed at after operation. Elevation of the foot of the bed to hasten venous return, avoidance of anything which will increase intraabdominal pressure, active diaphragmatic breathing movements and replacement of losses of body fluids are helpful. The author refers to a patient who conscientiously exercised his limbs during typhoid fever and developed extensive thromboses in all four limbs. Just what conclusion should be drawn from this experience was uncertain, but the author states that it dampened his enthusiasm for muscular exercise as a preventive measure.

Disorderly Action of the Heart.

R. O. MOON (*The Practitioner*, January, 1940) discusses affections of the heart in time of war. The condition which became known in the war of 1914-1918 as soldier's heart or "disorderly action of the heart" (D.A.H.), is a cardiac neurosis which occurs in civilians as well as in soldiers. It results from excitement as well as from effort; it is not the normal response to ordinary effort, but the arduous existence of the soldier, involving much physical and emotional strain, evokes symptoms that would otherwise have remained latent. Apart from the physical and emotional strain of military life, temporary myocardial damage by malaria, trench fever and dysentery are contributing causal factors in the development of what is called soldier's heart. In discussing the symptoms the author states that the dyspnœa after physical or mental exertion is out of proportion to either; the respiratory rate rises to 40 or even 70 per minute, but returns to normal during sleep, and usually remains normal apart from exertion or emotion. The precordial pain is generally in the nature of discomfort about the chest, without distinct localization or type, and causes the patient anxiety out of all proportion to its intrinsic severity. The origin of the pain is spontaneous; it occurs independently of exercise or any other obviously exciting cause, but may be traced back to some emotional disturbance. Palpitation is a frequent symptom; it implies increased force or frequency, or both, in the contraction of the heart, and is associated with an unpleasant consciousness of the beating of the heart, the rhythm being usually regular, although extrasystoles may be present at times. The sensations experienced by the patient are more of the nature of precordial discomfort than pain. The author refers also to the giddiness, vasomotor disturbances and the tachycardia commonly noted in these cases. He ascribes the giddiness on rising rapidly to the erect posture or immediately on the cessation of effort partly to the increased fall of blood pressure noted in these acts as compared with the normal person. The prognosis in these cases is good as far as life is concerned, but many patients drift into leading semi-invalid lives and a complete recovery is not common. The therapeutic measures suggested by the author include rest in bed for only a short while and only in the presence of severe precordial pain, severe headache or severe giddiness. Alcohol should be avoided; the use of tobacco should be strictly moderate; the physician should not spend too much time on examination of the heart.

The Bacteriology of Tuberculous Pulmonary Cavities.

G. ZORZOLI AND G. FOJANINI (*Annali dell'Istituto "Carlo Forlanini"*, November-December, 1939) conclude from a study of material aspirated by the method of suctional drainage from tuberculous pulmonary cavities in living subjects that the cavities contain no germs other than the tubercle bacillus. After a time the cavities treated by this method become infected; but the infection apparently has no influence on the course of the disease.

Calcium in Occlusive Vascular Disease.

H. S. WEICHSEL (*Annals of Internal Medicine*, January, 1940) discusses the intravenous use of calcium in occlusive vascular disease in a series of his patients, and states that this therapeutic measure has achieved definite relief of rest pain and night cramps, and material and persistent increase of claudication distance. He found that oscillometer readings showed an appreciable increase of the pulse amplitude in a considerable number of cases, and that several patients showed consistent improvement in spite of gradual reduction in oscillometric readings over a period of years, apparently indicating an increased efficiency of the collateral circulation. The author administers two grammes of calcium chloride intravenously once a week for twelve-week periods, adding the required amount of a 50% stock sterile solution of calcium chloride to an infusion of normal saline solution and taking care that the vein is accurately punctured before the calcium chloride is added. Clinically he has noted relief from pain (at first for periods of twenty-four hours, and later becoming semi-permanent as treatment is continued), relief from night cramps, the rendering of cold extremities warm again, and increased ability to walk with increase of claudication distance up to ten or twelve times the original distance. The majority of the author's patients suffered from arteriosclerosis, and others from *thromboangiitis obliterans*. He emphasizes the great risk of using the method in digitalized patients, and states that in view of the synergism of calcium and digitalis, it should not be used for any patient receiving digitalis therapy. Calcium

appears to be a vasodilator, as a result of parasympathetic stimulation or of sympathetic inhibition, and although it is not rational to believe that any substance can actually dilate an occluded blood vessel, the author holds that calcium, by its vasodilator effect, fosters and improves the collateral circulation in cases of occlusive vascular disease.

The Brain in Malignant Hypertension.

E. F. ROSENBERG (*Archives of Internal Medicine*, March, 1940), from an examination of the brains of persons who had died of malignant hypertension, states that several distinct types of cerebral lesion occur in this disease, namely, intracerebral and extracerebral œdema, multiple miliary destructive lesions (hæmorrhages, infarcts or both) and large destructive lesions. Each type of lesion is associated with its own syndrome. Destructive lesions were found in about 70% of the brains examined. In the past many of the clinical phenomena of malignant hypertension were attributed to spasm of cerebral vessels. This spasm may indeed occur and is perhaps responsible for some of the lesions; but the conception may lead to an unjustified sense of security concerning the brain. A history of focal cerebral symptoms was found to be associated constantly with more or less widespread destruction when the brain was examined carefully after death.

The Significance of Cardiac Arrhythmia with High Blood Pressure.

N. FLAXMAN (*Archives of Internal Medicine*, March, 1940) points out that arrhythmia may occur at any time during the course of hypertensive heart disease and is often the first indication that the heart is affected. It does not tend to remit or to change in character. The mortality among 243 patients with arrhythmia in a group of 800 patients with hypertensive heart disease was less than among those with regular sinus rhythm, owing to the comparative infrequency of coronary thrombosis. Since the arrhythmia often led to myocardial insufficiency, if this was not evident already, treatment with digitalis or quinidine was necessary. Digitalis was indicated when the symptoms or signs of congestive heart failure were present regardless of the type of arrhythmia (with the exception of paroxysmal tachycardia).

Chemotherapy in Infectious Diseases.

A. R. THOMPSON (*The Practitioner*, January, 1930) discusses the chemotherapeutic management of some of the acute specific fevers. He states that collected experience suggests that in scarlet fever the initial toxæmia is unaffected by the sulphonamide drugs, but that the best results are achieved by the use of a combination of antitoxin and this group of drugs. It is in the treatment of established complications of this disease, such as *otitis media*, mastoiditis and hæmolytic streptococcal septicæmia, that he has found sulphanilamide of great therapeutic benefit. The author states that although the ætiological agents of measles and whooping cough are not influenced by the sulphonamide drugs, a high proportion of the complications of these diseases are due to secondary infection with the hæmolytic streptococci, the pneumococcus and the influenza bacillus, and therefore may respond favourably to chemotherapy. He suggests the use of small doses of sulphapyridine in the catarrhal stage of measles and higher doses in the presence of a complicating pneumonia. The author considers that it is apparent that the sulphonamide drugs, by reason of their bacteriostatic effect on typhoid bacilli, in the blood stream, reduce toxæmia and render the urine free from organisms within a few days in cases of enteric fever. Chemotherapy has been reported to be of value in the treatment of typhoid carriers.

Mitral Stenosis.

B. J. WALSH *et alii* (*Archives of Internal Medicine*, February, 1940) have made a clinical study of eighty-one young persons who had acquired the physical signs of pure mitral stenosis. They state that the evolution of the physical signs prior to the establishment of this deformity took in the majority from five to fifteen years and that a relatively mild form of rheumatic fever appears to favour the development of this particular lesion.

Simple Method of Preventing Urinary Suppression after Mismatched Blood Transfusion.

L. E. H. WHITBY *et alii* (*The Lancet*, February 24, 1940) point out that death from incompatible transfusion is due to the formation from hæmoglobin in the renal tubules (where the pH value of the glomerular filtrate changes from pH 7·3 or higher to pH 5·4 or less) of methæmoglobin, which becomes crystallized as acid hæmatin. This process is prevented if a urinary output of at least 1·5 litres per day can be maintained and if the pH value of the urine can be kept constantly on the alkaline side of pH 6·4. These conditions are fulfilled by the administration of 35 grammes of potassium citrate in two litres of water every 24 hours until hæmoglobinuria has ceased. Lemon squash was found to be the best corrective of taste for the citrate: beef tea, coffee and milk also completely disguise the flavour of the drug. As soon as intravascular hæmolysis is suspected, a single dose of 8·0 grammes (120 grains) of potassium citrate should be given; this will render the urine alkaline within half an hour. Alternatively, 150 cubic centimetres of 3% solution of sodium citrate may be given intravenously. To unconscious patients the potassium citrate solution can be given by the drip-feed method through a stomach tube. During the treatment the urine should be coloured red by hæmoglobin; the brown colour of methæmoglobin indicates that the urine is not sufficiently alkaline.

Tuberculosis of the Naso-Pharynx.

J. W. TRENIS (*The American Journal of the Medical Sciences*, March, 1940) presents two cases to demonstrate that tubercle bacilli in the sputum may arise from tuberculous ulceration in the adenoid area of the posterior naso-pharyngeal wall. In one of the patients no other possible source of the bacilli could be discovered.

Valvular Calcification in Heart Disease.

B. S. EPSTEIN (*Archives of Internal Medicine*, February, 1940) states that the presence of calcification in the heart valves does not influence the heart sounds and is *per se* of no appreciable prognostic significance.

Syphilis of the Coronary Arteries.

J. PORTO (*La Presse Médicale*, November 24, 1939) describes two cases of obliteration of the mouth of the coronary arteries in syphilitic aortitis. In one case the right coronary artery was completely obstructed at its aortic orifice. After death the left coronary artery was injected with six cubic centimetres of an opaque liquid and a radiograph was taken. This revealed that the ramifications of both right and left coronary arteries were completely filled and that there was an extensive collateral circulation. In the second case the orifice of the right coronary artery could not be demonstrated. Injection of opaque liquid was made into the left coronary artery, which was also much narrowed. More than the usual quantity of liquid was injected. The radiograph showed the whole cardiac territory impregnated with the opaque material. In both these cases the narrowing of the orifices of the coronary arteries had been gradual in onset, and an extensive collateral circulation had developed. In each case the patients continued to live their normal lives, which involved considerable exertion, until a few weeks before death. In syphilitic disease the coronary anastomoses are more extensive than in other forms of coronary arteritis, because fewer branches are obliterated by disease in syphilis. Many authors have suggested, and proof has been obtained, that the veins of Thebesius can provide an adequate collateral circulation for the myocardium. It is suggested that these veins must be the source of the blood supply to the heart muscle in those cases in which both coronary arteries have been occluded some time before the final illness.

Special Articles on Psychiatry in General Practice.

(Contributed by request.)

I.

THE PROBLEM OF CLASSIFICATION AND DIAGNOSIS.

THE first great need in the study of any subject is the precise definition of its limits and its objectives. In most cases these may be clearly defined. Psychiatry, if not unique, is at least a peculiar branch of knowledge. Its boundaries are ill defined. Its range is enormous. Its ramifications stretch not merely through every branch of medicine; they infringe on such diverse domains as religion, poetry, literature and sociology. The final word on psychiatry will be written only when every other branch of knowledge is complete. Added to these disadvantages is the fact that its principles have been studied only at a comparatively late date. Its workers are still exploring new avenues and have not had sufficient time to coordinate adequately their findings. None the less, so great is the importance of psychiatry to general practitioners that they must be conversant with a working knowledge of its principles.

The layman recognizes two types of classification, a condition of "nerves" and "insanity". Our own text-books have a more precise nomenclature. The psychoses stand at one end of the scale, the neuroses at the other. Between them the psychoneuroses include hysterias, obsessional and anxiety states. Perhaps the most common view is that we must deal with "insanities" or psychoses, "nerve" cases or the neuroses and the borderline cases which fall into an intermediate position. In general medicine a precise classification is essential to treatment; psychiatry differs in that even for the expert it is not merely difficult, but often misleading.

At times it is even impossible to differentiate a psychosis from a neurosis. A commonly accepted criterion is the presence or absence of insight. The psychotic lacks an understanding of his condition, whereas the neurotic is open to argument. There are other criteria, as shown in the following list:

Psychosis.	Neurosis.
1. Presenting depression.	1. Presenting "anxiety" or "fatigue".
2. Somatic complaints absent or few.	2. Somatic complaints prominent.
3. Remorse and self-reproach present.	3. Absent or "insincere".
4. Does not blame others.	4. Blames others.
5. Loss of weight invariable.	5. Not invariable.
6. Constipation invariable.	6. Not invariable.
7. Depersonalization present.	7. Absent.
8. Cause often not discoverable.	8. A cause discoverable or clear.
9. Steady course.	9. Unsteady variable course.
10. Healthy except for attacks.	10. Seldom absolutely well.
11. Positive family history.	11. Negative family history.

Analysis of a large number of case histories shows that these criteria are so unreliable as to be worthless. It will be seen from the above that classification is arbitrary and largely superficial.

As Howe has said:

> It may seem strange that even now there should be all this confusion about "nervous" and "mental" disorder, but the fact remains that the problem is still regarded from two quite different points of view, which may be described as the "neurophysical" and the "psychological", according to whether we think the "nerves" or the "mind" (including the feelings or emotions) are at fault.

A simple classification of the neurophysical cases can be adopted. These can be treated by such simple means as rest, encouragement, fever therapy and medicines. They require a minimum of psychological aid. The classification is as follows:

1. Fatigue states.
2. Toxæmias.
3. Endocrine disorders.
4. General paralysis.
5. The physical states.

We are left with a large ill-defined residue of psychological cases. These can be roughly grouped in the following manner:

The anxiety states, in which fear or anxiety is the predominating feature.

Hysterical states, in which a split in personality symbolizes an emotional conflict.

Obsessional states, in which phobias and obsessions create the main colouring.

Dissociated states, which include *dementia præcox* (schizophrenia) and paraphrenia. Both are characterized by delusions and hallucinations.

Paranoid states, characterized by a pure systematized delusional system devoid of hallucinations, in which emotional depression and elation play the principal part.

The neurasthenias, a misleading term, which denotes merely the rubbish heap of those disorders which do not clearly fit into the other pigeon holes.

There is another group in which are the eccentrics, who exhibit merely a variation from normal.

In actual practice such a classification is conspicuous by its inadequacy. It may be regarded as a series of pegs upon which to hang hats. Unfortunately, however, the hats stray to other pegs and confusion results. A patient with predominant anxiety has obsessions and later exhibits splitting of the personality *et cetera*. Such changes may occur at short intervals or they may be coexistent. Even experts differ as to the appropriate peg. The unskilled psychiatrist may therefore be excused a feeling of bewilderment. Insistence upon the necessity for making a precise diagnosis on these lines must be deplored also on other grounds. It produces bias. It perpetuates the cardinal sin of fixing an opinion so that one ignores the possibility of therapy on other lines. It destroys the only sane outlook for the psychiatrist—the open mind and the broad vision.

The general practitioner is therefore advised not to follow lavishly a rigid classification, but to regard the condition of each patient as an individual syndrome. The symptoms are the expression of underlying causes, in the same manner as the symptoms in fever are due to a series of changes in body functioning. We may employ symptomatic treatment for the relief of the symptoms accompanying hyperpyrexia, but our main objective is to treat the cause. If we approach the problem from this angle, the problem becomes far simpler. We search for the particular maladjustment in three fields: the environment, the physical organic, and the mental. We assess the maladjustments; we correct them and await the result. If the result is unsuccessful, we make a further search for cause, and, if still unsuccessful, we continue the search or procure assistance. It is true that we may not have achieved the intellectual satisfaction of correctly naming the disease in a scientific sense; but as a sop to our vanity there is a realization that as each case is an individual syndrome, their names must be legion. And, after all, what's in a name? Actual cases will clearly illustrate the working of the syndrome method.

Mrs. X complains of vague fears. She is obsessed by the idea of impending insanity. She is afraid to go out, is irritable, and feels that she is losing the respect of her family. Examination reveals the following:

E. or Environment Factor. She is kept at home by reason of a domineering and invalid mother. Contacts with the external world are almost non-existent.

O. or Organic Factor. She is hypothyreoid. She has suffered for years from a prolapsed uterus, uncontrolled by a pessary. The discomfort makes her chary of travel.

P. or Psychological Factor.—There is marked maternal fixation with retention of the submissive role. Although married and possessing three children, she retains the childish mother imago. She is quite unable to face reality and resolves the perpetual mother *versus* husband conflict by a mere irritability and discontent.

The treatment was simple: insistence on the making of more contacts, correction of hypothyreoidism and a psychological discussion of her problem. Recovery was rapid in spite of the fact that she refused to have an operation for her uterine prolapse.

Every case may be analysed in a similar manner. Mrs. Y is the subject of profound obsessions. She washes her hands incessantly to free herself from bacteria. Her clothes are washed daily, if not twice daily, to prevent contamination by blood.

E. Factor. She lives in the outback on an isolated station. As she is childless, her only companion is a dominating and exacting husband. She rarely takes a holiday.

O. Factor. She is undernourished and definitely "below par" in a physical sense. Persistent insomnia is no doubt a contributing cause.

P. Factor. As long as she can remember she has been of the conscientious over-scrupulous type. The blood and disease obsession commenced with shock when she had a miscarriage and no help was procurable.

The lines of treatment consisted in correction of the E. factor by converting the husband to an alteration in the household routine. O. was remedied by a period of rest in hospital and over-feeding. P. factors were dealt with by a series of psychological conversations, in which the rationale of her symptoms was discussed. It is unquestionable that the success of the remedial measures were due to the energetic correction of all three factors. If only one had been combated, failure would have resulted.

In conclusion it must be admitted that whilst a policy of jettisoning the diagnostic nomenclature simplifies the problem of treatment, there is perhaps a greater need for clinical acumen. It entails a wide survey of all possible factors, and the only royal route to success is through the thoroughfare of thoroughness.

If the letters "E", "O", "P" were used as an *aide mémoire* to the routine search for environmental, organic and psychological factors, much would be visible that otherwise would be missed.

JOHN BOSTOCK, M.B., B.S. (London), D.P.M., F.R.A.C.P., Senior Psychiatrist, Brisbane General Hospital; Research Professor of Medical Psychology to the University of Queensland.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on April 24, 1940, at the Robert H. Todd Assembly Hall, British Medical Association House, 135, Macquarie Street, Sydney, PROFESSOR W. K. INGLIS, the President, in the chair.

Spinal Analgesia.

DR. A. DISTIN MORGAN read a paper entitled "Spinal Analgesia" (see page 1).

DR. HOWARD BULLOCK expressed his appreciation of Dr. Morgan's masterly treatment of the subject. He had been specially asked by Dr. S. V. Marshall to attend the meeting, and he had wondered why. Dr. Marshall's explanation was that Dr. Bullock had lived through the period of spinal anæsthesia since its introduction. He had consulted Labat's book on regional anæsthesia and found that, according to Labat, Corning had suggested the use of subarachnoid block in surgery in 1885, that Bier in 1898 had been the first to introduce it by using cocaine, but soon discarded this form of anæsthesia on account of the toxicity of cocaine, that the discovery of "Stovain" in 1904 by Forneau and its comparative safety had given confidence to the profession, who had readily adopted it and spinal anæsthesia. In that year Dr. Bullock had become a student at the Sydney University, so Dr. Marshall's contention was more or less correct. Later, when Dr. Bullock was resident medical officer at Prince Alfred Hospital in 1908 and 1909, spinal anæsthesia had not been used in one case; but in late 1909, when he had first started post-graduate study in England, spinal anæsthesia was in full swing. Barker was the pioneer in England and chief advocate of its use. McGavin was using it freely at the Dreadnought Hospital and advising it for neck dissections. In 1912 Dr. Bullock had been privileged to meet Owen Richards, who had just published a paper on spinal anæsthesia in *The British Medical Journal* of December 7, 1911. Richards had had experience of many hundreds of cases and had worked in Cairo with Madden, of Victoria. Richards had told Dr. Bullock that he had carried out the work chiefly to check up Barker's results, which he had found substantially correct. Richards had had some deaths, and estimated that, in inexperienced hands, there would, from one or more causes, be 10% failure to produce anæsthesia. Dr. Bullock still saw men failing in the use of spinal anæsthesia. When he had commenced practice in Sydney in 1913 anæsthetists were not using spinal anæsthesia. The surgeon had to induce anæsthesia himself and then hastily scrub up and operate. At that period "Stovain" was the anæsthetic agent; then "Novocain" came to the fore. Looking back, he wondered how deaths had been avoided; but, miraculous to relate, none had occurred. Respiratory distress and vomiting had been considered due to the anæsthetic rising high in the spinal canal, and, to overcome this, patients had been put in the sitting posture, which, of course, had accentuated the symptoms, and they now knew this had been, and still was, the worst possible thing to do. Dr. Morgan had referred in a scientific and practical way to the use of the Trendelenburg position and the reasons for using it. Dr. Bullock was greatly impressed. If the vaso-constrictors became paralysed and blood accumulated in the trunk and limbs, obviously the brain would be starved of blood. Posture, then, was the chief means of preventing this and the fall of blood pressure, and probably too it would minimize post-operative morbidity. Dr. Bullock then, as a general surgeon, gave his opinion of spinal anæsthesia. He said that he was one of those fast-disappearing rarities, the general surgeon traversing surgically most regions of the body. In abdominal surgery it was frequently necessary for the surgeon to alter his plan and place of attack. He might begin an operation in the lower part of the abdomen and find himself obliged to transfer his activities to the upper part of the abdomen. In this respect, then, the use of spinal anæsthesia was a weakness, as it was not advisable as a routine to produce anæsthesia higher than was necessary. Again, it must be remembered that spinal anæsthesia caused relaxation of the anal sphincter. Abdominal manipulation might force fæces from the anus, and these might trickle, with the patient in the high Trendelenburg position, onto the abdomen and also soil the perineum. The latter accident alone would be a considerable misfortune in abdomino-perineal excision of the rectum. Spinal anæsthesia was, however, very useful in surgery of the urinary bladder, in that it gave such complete muscle relaxation. An aftermath to be carefully watched for was, with the return of blood pressure to normal, unexpected hæmorrhage. Dr. Bullock thought that the most potent indication for the use of spinal anæsthesia was in chest disorders when inhalation anæsthesia was contraindicated. Dr. Bullock paid a tribute to the anæsthetic specialists who had in Sydney raised the standard of anæsthesia to great heights. He looked upon spinal anæsthesia as only a small part of the anæsthetist's armamentarium, and added that he would not be content to have 85% of his operative work done under spinal anæsthesia, as Dr. Distin Morgan had mentioned having seen in some clinics abroad. He would be bitterly disappointed to see the anæsthetists, who had developed Herculean muscles carrying about huge pieces of apparatus,

arriving with the anæsthetic in their waistcoat pocket. Dr. Bullock was deeply impressed by the simplicity of their technique and swiftness of anæsthesia in actual practice; but anyone hearing these same men that evening describe the dangers and pitfalls of spinal anæsthesia would forever avoid its use. He had the impression after observing its use in a great number of cases, that great attention to detail must ever be given and all possibilities of danger thwarted. The administration of spinal anæsthesia was an art in itself, and although deaths, it was said, were due to cardiac failure, probably inexperience played a large part. He thought that spinal anæsthesia belonged to the province of the expert and was not for the inexperienced.

DR. R. J. SILVERTON said that he had been invited specially to attend the meeting. The subject was of great interest to him. He was one of those surgeons who had been forced into using spinal anæsthesia because it was very suitable for many urological procedures. His earliest contact with spinal analgesia was in Cairo, in 1918, when Frank Cole Madden and one of the leading gynæcologists of the Egyptian Hospital were interested in the subject. The gynæcologist had used it in some thousands of cases and had established it as his routine method. When Dr. Silverton arrived at Saint Peter's Hospital in London, he had mentioned spinal anæsthesia to Sir Francis Shipway, the great anæsthetist, who immediately said that they could have nothing to do with it. Dr. Silverton had asked why, and had been told that they had tried it and had had all the usual troubles—falling blood pressure, respiratory and circulatory failure. Dr. Silverton had asked permission to try it again. In those days the only pressor agents were pituitrin and adrenaline, both of which were ephemeral in their effect. Sir Francis Shipway was a scientist and was very enthusiastic, and he gave Dr. Silverton permission to give spinal anæsthesia a further trial. Dr. Silverton said that they had found that the chief thing to do was to posture the patient so that the heavy solution did not rise too quickly. The next step was in connexion with tuberculosis of the kidney; in this condition they were unable to make a diagnosis with general anæsthesia because of the very irritable bladder reflex. Moreover, spinal anæsthesia produced a fall in blood pressure, and therefore the kidneys would not function. However, when the anæsthetic solution, used in small quantity, was kept over the sacral segment of the cord, they were able to keep the kidneys working so that a specimen of urine could be obtained, and in addition the bladder remained quiet. In cystoscopic diagnosis the patient was kept vertical for three or five minutes and was then placed flat; the solution did not rise much further in the theca. Dr. Silverton said that this was the beginning of low spinal anæsthesia, and was described by him in 1924, although Pitkin, an American, claimed to be the first in the field in 1931. The most important event in the recent history of spinal analgesia was the introduction of ephedrine, a satisfactory pressor agent, as well as the introduction of "Percaine", a long-standing analgesic. Dr. Silverton said that he could not help reiterating how important it was to estimate the patient's blood pressure before the analgesic was given. An adequate prophylactic ephedrine supply should be given as a routine measure during a short period before and a short period after the induction of spinal anæsthesia. If the patient was hypertonic there was no need to give ephedrine beforehand. If the patient was hypotonic, the first dose should be given half an hour or twenty minutes before the induction of anæsthesia and another five minutes before it; a third dose should be given five minutes afterwards. Dr. Silverton congratulated Dr. Morgan on his scientific and able presentation of the subject. He said that it was a very real advantage that they had in Sydney anæsthetic specialists with whom they could discuss these matters. There were four or five expert anæsthetists in Sydney who understood the scientific basis for the phenomena of spinal anæsthesia. For that reason the Etherington Wilson technique was much better than the Howard Jones technique. Jones pushed the anæsthetic right through the whole length of the theca, and too much force was used. Dr. Silverton did not think that the spinal canal should be treated in such a fashion, and he approved of the quieter technique of Etherington Wilson. With regard to the hypobaric technique, Dr. Silverton said that he thought it inferior, because the patients were lying on their backs and the anterior spinal nerve roots were influenced more than the posterior roots. It was the posterior roots that had to be influenced, because the primary requisite was sensory paralysis, sensory analgesia, not muscular relaxation. Dr. Silverton still thought that the safer, better and simpler technique was the heavy solution technique, except in one instance, in kidney operations. In these operations the patient was laid on the side opposite to the one on which the surgeon was operating, and it seemed reasonable to hold that the lighter solutions would act more strongly on the side which was uppermost, the one on which the surgeon was operating. It was very pleasant to perform kidney operations using spinal anæsthesia. One of the most important factors was the person who was giving the anæsthetic; if he was experienced, was giving such anæsthetics constantly and used ephedrine prophylactically and adequately, all their fears would be gone for good.

DR. S. V. MARSHALL thanked Dr. Morgan for his excellent review of the subject and for the demonstration he had given. Dr. Marshall then referred to phrenic paralysis. He said that this was not so dangerous as it sounded, because sometimes the nerves were not completely blocked and breathing would continue even if the analgesia was up to the patient's chin. At other times phrenic paralysis was a real danger. Dr. Marshall recalled a case in which he had been associated with Dr. Bullock. An operation for double hernia was being performed; phrenic paralysis occurred and ordinary breathing ceased. The patient kept himself going with his sterno-mastoids and other accessory muscles, and with the aid of a little oxygen. In another case epidural analgesia was being used; phrenic paralysis was not supposed to occur with this technique. The patient was undergoing lobectomy, and he presented a real problem, but he survived. Dr. Marshall said that bradycardia and vomiting were possibly due to unopposed vagal activity and could be offset by the administration of atropine beforehand. There was a danger in the use of excessively high oxygen concentrations: should profound respiratory depression or paralysis occur, the patient would absorb the oxygen already in the alveoli and massive atelectasis might ensue. It was better to "fill him up" with air, since nitrogen was absorbed slowly. Oxygen was not to be condemned, but oxygen mixed with air was safer for therapeutic purposes. To sustain the blood pressure after analgesia had developed there was nothing to equal "Neo-synephrin hydrochloride". There was no need to give it intravenously. Ephedrine given a quarter of an hour beforehand would sometimes sustain the blood pressure and very often not. Large doses would give the patient "the jitters" and cause cardiac irregularities. Dr. Marshall thought that since "Neo-synephrin hydrochloride" had been introduced, he felt happy about high spinal analgesia. The dose might have to be repeated, but it did work, and it gave the anæsthetist a great sense of security. Dr. Morgan had said that the effect of "Percaine" was fairly rapid; Dr. Marshall had sometimes found it disconcertingly slow; it might take up to thirty minutes to produce its full effect. One of the disadvantages of "Percaine", and one of the reasons why procaine should be used whenever possible, was that procaine advertised its maximum ascent very rapidly. Dr. Marshall thought that Etherington Wilson's technique would largely displace Howard Jones's technique. Etherington Wilson had said that the patient should be at a slight slope forward, not, as Dr. Morgan had said, upright. As Dr. Silverton had acknowledged, if the operation was unilateral, the patient could be put down on the opposite side at once, so that a more intense analgesia was obtained on the desired (or uppermost) side. Dr. Marshall then referred to muscular rigidity. Paralysis of the anterior (motor) roots was not essential. He said that it was the posterior roots that had to be affected; it was only necessary to break the reflex arc to ensure relaxation. No mention had been made of the neurological complications that occasionally arose after spinal analgesia. Most reports of these

complications came from America, where alcoholic solutions were largely used, and several cases of permanent pareses and paralyses *et cetera* had been reported. Dr. Marshall thought that the alcohol content of the solutions used might be responsible. The solutions commonly used in Australia contained no alcohol. Dr. Bullock had mentioned that spinal analgesia was useful in chest conditions; but pneumonia, atelectasis *et cetera* were possibilities, even after spinal analgesia. This was an argument against the use of solutions whose effect lasted too long. In conclusion, Dr. Marshall urged those using spinal analgesia not to send the analgesia higher than necessary, and not to use agents that would act for longer than was needed.

DR. W. I. T. HOTTEN thanked Dr. Morgan for his interesting exposition of the subject. He was in entire agreement with Dr. Morgan that those who intended practising this form of anæsthesia should fully appreciate the anatomical and physiological factors involved. Dr. Hotten said that he owed his first introduction to spinal analgesia to Dr. Silverton, when as a medical student in 1922 he saw Dr. Silverton use it at the Royal North Shore Hospital. In 1930, when Dr. Hotten joined the staff of the Royal Prince Alfred Hospital, the number of spinal anæsthetics could be counted on the fingers of one hand; in fact, Dr. Hotten did not remember seeing many spinal anæsthetics given. In 1932 he attended a meeting of the Royal Australasian College of Surgeons in Sydney, and his interest was greatly stimulated by Dr. Silverton's exposition of his technique with hyperbaric "Percaine" solution. From that time onwards spinal anæsthesia came to be more frequently used at the Royal Prince Alfred Hospital. It was largely due to the specialty of urology that spinal analgesia became popular. Dr. Hotten then said that he had thought that it might be of interest to go through the number of operations performed at the Royal Prince Alfred Hospital from July 1, 1939, up till the time of the meeting, and to find out how many of them were performed under spinal analgesia. The operations performed numbered 6,049, and of that number 280 had been performed under spinal analgesia administered by a member of his department. In Dr. Hotten's private practice 632 anæsthetics had been given in the same period, and of these, 75 were spinal anæsthetics. At the Royal Prince Alfred Hospital the spinal anæsthetics were in the proportion of about 4·8%. Dr. Hotten said that he had no personal predilection for spinal anæsthesia; but he thought that it was admirably suited to operative procedures below the level of the umbilicus in certain circumstances. These included the presence of pulmonary complications (tuberculosis, bronchitis *et cetera*) or diabetes. Spinal anæsthesia was also very suitable for the strong robust man who was to have a hernia repaired, and in certain urological procedures. Dr. Hotten then referred to premedication. He said that when Dr. Silverton gave his address in that same hall some years previously, he (Dr. Silverton) believed that plenty of premedication was necessary. He thought that it was an important factor in preventing the fall of blood pressure associated with psychic shock, as well as having a psychological effect. Moreover, certain positions were very uncomfortable for the patient, for example, the Trendelenburg position, in which the patient complained of the pressure of shoulder supports, or in the lateral position, particularly when draped over a kidney saddle, or in the undignified lithotomy position. Some of these positions offended and upset patients, especially females, and made them very difficult to handle unless they were adequately premedicated. Dr. Hotten employed ampoules put up by the firm of Hoffmann-La Roche, containing "Omnopon" and scopolamine. If after the premedication the patient was still not happy and quiet, Dr. Hotten found it very valuable to have the services of a gas machine to administer a light cyclopropane anæsthetic. He thought that this had other advantages as well, for example, during the operation the patient might have hiccup or might attempt to retch. Light cyclopropane anæsthesia would correct this and allow the operation to proceed smoothly. It was also valuable in cases in which, as Dr. Bullock had mentioned, the surgeon might decide that it was necessary to use a higher approach or a longer incision than was expected. Further, it permitted the administration of high percentages of oxygen. The rapidity and smoothness of action of cyclopropane made it extremely useful. In conclusion, Dr. Hotten said that there were in Dr. Morgan's paper a few points with which he disagreed, but on the whole he thought that Dr. Morgan had presented the subject in a most admirable way.

DR. C. CRAWFORD MACKELLAR said that although he knew little about the subject, he wished to ask two questions. The first was whether he had really read that people were using complete spinal anæsthesia for mastoid and head operations. The second question was to what degree the presence of hæmorrhage was a contraindication, having regard to war conditions.

DR. COLIN EDWARDS said that he had greatly enjoyed Dr. Morgan's paper and the discussion. He had given many spinal anæsthetics, and he had not realized how scientific the procedure had become. He was in England when "Percaine" was introduced, and Sir Francis Shipway had said: "This stuff has been sent over from Switzerland; how about trying it?" Dr. Edwards had done his best to follow the instructions, which were in German, and the next morning he found that one of the patients had anæsthesia in the legs fourteen hours after the anæsthetic had been given. Dr. Edwards had given the patient about five times the dose that was used at the present time. He mentioned this incident on account of the accidents and dangers that had been spoken of. His experience led him to believe that serious accidents were extremely rare. In approximately 5,000 cases he had had no death, nor anything that looked like death. He had had one case in which convulsions occurred, many in which there were collapse and vomiting, and several in which cardiac failure appeared to be present. Only in recent years had they had the great advantage of having oxygen at hand, and the even greater advantage of having the anæsthetist available. Dr. Edwards was very pleased to have the services of the anæsthetists.

Dr. Morgan, in reply, said that several points had been brought up by other speakers, for which he was grateful. They had clarified the situation and emphasized some most important aspects of the subject. Dr. Bullock had spoken of the suitability of spinal anæsthesia in chest conditions and had said that the administration of a spinal anæsthetic was work for an expert; Dr. Morgan thought Dr. Bullock entirely right. There were men who had given spinal anæsthetics in 40,000 to 60,000 cases. They had found that as they had perfected their own technique and as their own experience had increased, the mortality rates of their earlier days had disappeared. Other important factors were the improved drugs that had been introduced and the perfection of the gravitational method of placing the drugs accurately. In the old days many methods had been tried for placing drugs at different levels. In some cases there had been inaccuracy in technique and the level of anæsthesia had been too high. Dr. Silverton had referred to ephedrine; its introduction had marked a definite epoch in analgesia. Dr. Morgan said that he was not giving spinal anæsthetics in the days before ephedrine, but it had undoubtedly made the procedure very much safer. With reference to the hypobaric technique of Howard Jones, Dr. Morgan said that Jones had a technique in which he used these solutions, but did not attempt to control them simply by gravity; large volumes of cerebro-spinal fluid were removed and replaced. This method was difficult to control and there was a very real danger to the spinal canal.

Dr. Marshall had introduced several interesting points. When Dr. Morgan was in Madison with Professor Waters considerable experimental work had been done with high concentrations of oxygen. He had come to the conclusion that the exhibition in human beings of high concentrations of oxygen did not damage the lung tissues or predispose to atelectasis. Dr. Morgan had in his paper emphasized the necessity for oxygen to be given by the closed method. Another point of Dr. Marshall's concerned the Etherington Wilson technique. The whole object of the method was

to achieve precision; in the vertical position there was an even mixing and anæsthesia rose in a definite time to a definite level. The patient was then placed in the Trendelenburg position to an angle of 15° and the rising of the anæsthetic fluid was stopped. The use of the vertical position was very important; in fact, it was essential. Several deaths had occurred in England when this position was not used. The rising of the fluid when the spinal canal was not vertical was very much faster, and that was very dangerous. Dr. Morgan remarked that this technique had been introduced in 1934, and in England it came into extensive use only a little over a year prior to the meeting; they were using much smaller dosage than had been recommended originally.

Dr. Morgan then referred to Dr. Hotten's remarks on the value of premedication. Dr. Morgan thought that they often overlooked the far-reaching and devastating effects of psychic shock. Fear upset all forms of anæsthesia to a grave degree, and in spinal anæsthesia complications such as a fall in the blood pressure or respiratory depression could be reduced by premedication.

In reply to Dr. Mackellar, Dr. Morgan said that in America and in Europe certain people had employed complete spinal analgesia for mastoid and head operations. Complete anæsthesia of the whole of the head could be produced without paralysis of the phrenic nerve. Contra-indications were hæmorrhage and shock. When shock was already present and when there was a reduced amount of blood in the circulation, spinal anæsthesia was contra-indicated on account of the fall in blood pressure.

In reply to Dr. Edwards, who had drawn attention to the fact that spinal analgesia at the present time was not so dangerous as listeners would be led to believe, Dr. Morgan said that he did not think that anyone would consider spinal analgesia very dangerous now. In putting his paper together Dr. Morgan had thought that to give a complete survey of the subject would be too great a task, and that it would be better instead to discuss the things that had in the past prevented the use of spinal analgesia. He had shown the dangerous aspect of the subject and had dwelt on the contraindications of that form of anæsthesia, the anatomy involved and the basis on which it was founded. When the dangers and complications were known, it was possible to combat them. In low spinal analgesia they scarcely ever occurred. When they did occur, anæsthetists would agree that it was very probable that the anæsthesia had crept up a long way and that a number of white rami had become involved. These complications would and did occur in the hands of the inexperienced. Complications in the hands of the experienced, who had a sound technique and stuck to it, were becoming less and less.

PROFESSOR W. K. INGLIS thanked Dr. Morgan for his interesting paper. He said that to one altogether uninformed on the subject it had been very instructive to hear the paper and comments.

NOTICE.

THE Federal Council of the British Medical Association in Australia has cabled the Parent Body on behalf of the medical profession of the Commonwealth offering to provide a home for a number of children of their colleagues in Great Britain for the duration of the war. The offer has been gratefully accepted and it is desired to know how many will receive sanctuary. Members desiring information are invited to communicate with their Branch secretaries.

Post-Graduate Work.

LIBRARY SEMINAR AT SYDNEY.

THE next library seminar and clinico-pathological conference, arranged by the Post-Graduate Directors of Medicine, Surgery and Pathology, will be held at the Prince Henry Hospital, Little Bay, New South Wales, at 4.30 p.m. on Monday, July 8, 1940. The subjects will be: (i) "The Administration of Oxygen", Dr. W. I. T. Hotten; (ii) "Suture Materials", Dr. R. Melville. A cordial invitation to be present is extended to all medical practitioners.

WEEK-END COURSE IN MEDICINE.

A WEEK-END course in medicine will be held at the Prince Henry Hospital, Little Bay, New South Wales, on July 27 and 28, 1940. The fee for attendance at the course is one guinea, and application should be made to the Secretary, New South Wales Post-Graduate Committee in Medicine, the Prince Henry Hospital, Little Bay, from whom copies of the programme are available.

WEEK-END COURSE IN SURGERY.

THE New South Wales Post-Graduate Committee in Medicine will hold a course of instruction in surgery at the Prince Henry Hospital, Little Bay, during the week-end August 3 and 4, 1940. The programme is as follows:

Saturday, August 3.

9.30 a.m.—In Ward 22, cases of interest: The Director of Post-Graduate Surgery, Dr. H. R. G. Poate.

10.30 a.m.—"Some Considerations of the Effects of Oxygen Lack during Anæsthesia", Part I: Dr. W. I. T. Hotten.

11.15 a.m.—"Empyema and its Treatment", Dr. B. T. Edye.

12 noon.—"Diagnosis and Treatment of Carcinoma of the Rectum" (with slides): Dr. Howard Bullock.

2 p.m.—"Diagnosis of Scrotal Swellings": Professor H. R. Dew.

3 p.m.—"Hæmaturia: Diagnosis and Treatment": Dr. R. Harris.

4.15 p.m.—"Gastroscopy": Dr. J. E. Sherwood.

5 p.m.—"Clinical Aspects of Head Injuries": Dr. I. D. Miller.

Sunday, August 4.

9.30 a.m.—Clinico-pathological demonstration of diseases of the spleen: The Director of Post-Graduate Pathology, Dr. F. B. Byrom.

10.30 a.m.—"Some Pancreatic Diseases": Dr. T. M. Furber.

11.15 a.m.—"Ætiology and Diagnosis of Small Bowel Obstruction": Dr. J. S. MacMahon.

12 noon.—"Ectopic Gestation": Dr. F. A. Maguire.

The lectures will be held in the hospital lecture theatre. The fee for this course will be one guinea. Application for registration, accompanied by a remittance for the amount of the fee, must be made to the Secretary, New South Wales Post-Graduate Committee in Medicine, the Prince Henry Hospital, Little Bay.

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 113, of June 20, 1940.

AUSTRALIAN MILITARY FORCES.

EASTERN COMMAND.

Second Military District.

Australian Army Medical Corps.

To be Major (temporarily)—Captain A. D. Frost, with regimental seniority next after Major (temporarily) E. S. A. Meyers, 21st May, 1940. *To be Captain (provisionally)*—Robert Ewing Scott Charlton, and to be borne supernumerary to establishment pending absorption, 13th May, 1940; Captain J. G. Woods and Captain (provisionally) T. Wunderlich are transferred to the Reserve of Officers (A.A.M.C.), 10th May, 1940.

SOUTHERN COMMAND.

Third Military District.

Australian Army Medical Corps.

To be Captain (provisionally)—James Biggam Douglas Galbraith, 17th May, 1940. Captain (provisionally) I. T. Cameron is brought on the authorized establishment, 1st January, 1940.

Australian Army Medical Corps Reserve.

To be Honorary Captains—Noel Arthur Twiss, Arthur Littlewood Newson, Francis John Niall, William John Fuller Boake, Gilbert Lee Carter and Sydney Muir Smith, 24th May, 1940.

Fourth Military District.

Australian Army Medical Corps.

To be Major (temporarily)—Captain R. T. Binns, with regimental seniority next after Major (temporarily) F. K. Mugford, 17th April, 1940. Major E. F. West is appointed from the Reserve of Officers (A.A.M.C.), with regimental seniority next after Major (temporarily) R. T. Binns, 21st May, 1940.

Australian Army Medical Corps Reserve.

To be Honorary Captains—Albert Walter Grote, Douglas Gordon McKay, John Leonard Dunstone, Seabert Crawford Muir Downing, Mervyn Roy Gold, John William Rollison, George Herbert Solomon, Julian Andrews and Arthur John Blofeld-Moody, 1st April, 1940.

Sixth Military District.

Australian Army Medical Corps Reserve.

To be Captain—Percy Webber Black, 9th April, 1940.

Proceedings of the Australian Medical Boards.

VICTORIA.

A MEETING of the Medical Board of Victoria was held on June 10, 1940.

An application for registration from a foreign medical practitioner who holds the degrees of M.D. (Bologna), 1936, L.R.C.P. *et* S. (Edinburgh), L.R.F.P.S. (Glasgow), 1939, was considered and refused, as the applicant had not completed a regular course of medical and surgical study of five or more years' duration in a reciprocating country and was therefore unable to comply with the requirements of the *Medical Act* of 1938.

A complaint that a medical practitioner had charged a fee of one guinea for a certificate of death required for registration purposes was investigated, and it was held that, as the *Registration of Births, Deaths and Marriages Act*, 1938, of Victoria, makes it obligatory upon a medical practitioner to supply such particulars to the Registrar when he has attended the deceased prior to death, he was not entitled to charge a fee for the certificate.

The following death was reported: Francis Robert Guinane, on June 7, 1940.

The attention of medical practitioners is again drawn to the fact that the medical register will be shortly revised and that those whose address differs from that shown opposite their name should immediately communicate with the Secretary of the Board. Section 9 of the *Medical Act*, 1928, provides that failure to notify change of address may lead to the removal of the name of a medical practitioner from the register.

Notice.

WEEK-END LECTURES IN ADELAIDE ON ARMY MEDICINE.

A SERIES of lecturettes and demonstrations on various aspects of army medicine is to be given at the Institute of Medical and Veterinary Science, Frome Road, Adelaide, on July 13 and 14, 1940. Three sessions will be held, and at each session there will be four or five speakers.

On Saturday afternoon, July 13, the subjects will be "Army Medical Organization" and "Sanitation in War". The chairman will be Colonel H. A. Powell, C.M.G., V.D.

"The Physician in War" will be the topic on Sunday morning. Colonel C. T. Champion de Crespigny, D.S.O., V.D., will be chairman.

At the session on Sunday afternoon "The Surgeon in War" will be the subject discussed, and Lieutenant-Colonel Sir Henry Newland, C.B.E., D.S.O., will preside.

The course is open to officers of the Australian Army Medical Corps, medical practitioners, and senior medical students. Uniform need not be worn.

Obituary.

HARRY WHARTON MASON.

WE regret to announce the death of Dr. Harry Wharton Mason, which occurred recently at Tumut, New South Wales.

EDWARD SYDNEY LITTLEJOHN.

WE regret to announce the death of Dr. Edward Sydney Littlejohn, which occurred on June 24, 1940, at Croydon, New South Wales.

Analytical Department.

"SUCRETS."

THROAT LOZENGES known as "Sucrets", containing one in a thousand hexylresorcinol, come from the laboratories of Sharp and Dohme, Limited. The manufacturers state that the germicidal potency of each lot is standardized bacteriologically. They claim that five cubic centimetres of a saturated solution of "Sucrets" troches destroy one three-millimetre loop of a twenty-four hour standard broth culture of *Staphylococcus aureus* on less than fifteen seconds' contact. A sample of "Sucrets" was submitted to our bacteriologist, who reports that the claim of the manufacturers is correct.

Books Received.

CATECHISM SERIES. ANATOMY: HEAD AND NECK, by C. R. Whittaker, F.R.C.S.E., F.R.S.E.; Part III; Third Edition; 1940. Edinburgh: E. and S. Livingstone. Crown 8vo, pp. 74. Price: 1s. 6d. net.

MEDICAL DISEASES OF WAR, by Sir Arthur Hurst, M.A., D.M., F.R.C.P., with the cooperation of H. W. Barber, M.A., M.B., F.R.C.P., F. A. Knott, M.D., M.R.C.P., and T. A. Ross, M.D., F.R.C.P.; 1940. London: Edward Arnold and Company. Demy 8vo, pp. 327, with illustrations. Price: 16s. net.

THE MEDICAL ANNUAL. A YEAR BOOK OF TREATMENT AND PRACTITIONER'S INDEX, edited by H. L. Tidy and A. R. Short; 1940. Demy 8vo, pp. 650, with illustrations. Price: 20s. net.

Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Buckle, Donald Fergus, M.B., B.S., 1933 (Univ. Melbourne), Mental Hospital, Stockton.

The undermentioned has applied for election as a member of the Tasmanian Branch of the British Medical Association:

Dorney, Paul Lawrence, M.B., B.S., 1937 (Univ. Melbourne), 73, Federal Street, Hobart.

Diary for the Month.

JULY 9.—Tasmanian Branch, B.M.A.: Branch.
JULY 9.—New South Wales Branch, B.M.A.: Executive and Finance Committee; Organization and Science Committee.
JULY 12.—Queensland Branch, B.M.A.: Council.
JULY 16.—New South Wales Branch, B.M.A.: Ethics Committee.
JULY 17.—Western Australian Branch, B.M.A.: Branch.
JULY 18.—New South Wales Branch, B.M.A.: Clinical meeting.
JULY 23.—New South Wales Branch, B.M.A.: Medical Politics Committee.
JULY 24.—Victorian Branch, B.M.A.: Council.
JULY 25.—South Australian Branch, B.M.A.: Branch.
JULY 25.—New South Wales Branch, B.M.A.: Branch.
JULY 26.—Tasmanian Branch, B.M.A.: Council.
JULY 26.—Queensland Branch, B.M.A.: Council.
AUG. 1.—South Australian Branch, B.M.A.: Council.
AUG. 2.—Queensland Branch, B.M.A.: Branch.
AUG. 6.—New South Wales Branch, B.M.A.: Organization and Science Committee.
AUG. 7.—Victorian Branch, B.M.A.: Branch.
AUG. 7.—Western Australian Branch: Council.
AUG. 9.—Queensland Branch, B.M.A.: Council.

Medical Appointments.

Dr. I. M. Barrow has been appointed Government Medical Officer at Penrith, New South Wales.

* * *

Dr. Annie Mocatta has been appointed Temporary Honorary Physician to the "Mareeba" Babies' Hospital, South Australia.

* * *

Dr. J. M. Pedler has been appointed an Honorary Clinical Assistant to the Medical Section of the Royal Adelaide Hospital, Adelaide.

* * *

Dr. Milton Gray Edison has been appointed Quarantine Officer at Burnie, Tasmania, in accordance with the provisions of the *Quarantine Act of* 1908-1924.

* * *

Dr. J. G. Wagner has been appointed a Member of the Medical Board of Queensland, pursuant to the provisions of *The Medical Act of* 1939 of Queensland.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	Associated Medical Services Limited. All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Federated Mutual Medical Benefit Society. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17.	Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 178, North Terrace, Adelaide.	All Lodge appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	Wiluna Hospital. All Contract Practice Appointments in Western Australia.

Editorial Notices.

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